

Olibanarius infraspinatus has hitherto been recorded from Singapore, and appears to be common in the Bay of Bengal and in the neighbouring seas.

136. CLIBANARIUS, sp.

The collection contains three small specimens of a *Olibanarius*, collected at Elphinstone Island, and inhabiting shells of *Buccinum* and *Natica*. They are closely allied to *C. infraspinatus*, having the dactylopodites longer than the propodites, but they are readily distinguished by their coloration and by some other characters. They are closely allied to or perhaps even identical with *C. striolatus*, Dana, a species which was recorded by Heller from the neighbouring Nicobar Islands. In *C. striolatus* the left chelipede is a little larger than the right, whereas in these specimens the right is the larger one. The cephalothorax of the largest specimen is scarcely 11 millim. long. The gastric region is 5 millim. long and $4\frac{3}{4}$ millim. broad. The median frontal tooth is acute, triangular, and projects scarcely more forwards than the lateral frontal teeth. The eye-peduncles (5 millim. long) are a little longer than the breadth of the anterior margin of the cephalothorax; they are somewhat longer than the peduncles of the external antennæ, and also slightly surpass the peduncles of the internal antennæ. The right chelipede is a little larger than the left. The under surfaces of the arms present no trace of the spiniform tubercles characteristic of *C. infraspinatus*. Each arm is provided with the ordinary small spine at the distal end of the under margin of the outer surface; the wrist is armed with two or three acute spines along the inner margin of the upper surface, the distal spine of which is the largest. The upper surface of the wrist is somewhat uneven or tubercular. The upper surfaces of the hands are scarcely twice as long as broad; four or five acute teeth are found along the inner margin of the upper surface of the palm. The hands and the fingers are somewhat tubercular above. The carpopodites of the second and third pairs of legs are armed as usual with a spinule at the distal ends of their upper margins. The dactylopodites are distinctly longer than the propodites, the propodite of the right leg of the third pair being only 6 millim. long, whereas the dactylopodite is nearly 9 millim., *i. e.* almost once and a half as long as the propodite.

The gastric region and the legs are of a light rose-colour, and

the latter are longitudinally striated by delicate red lines, each of the outer and inner surfaces of the joints of the second and third legs being marked with four or five longitudinal striæ of a yellowish red. The legs are somewhat hairy.

137. *CLIBANARIUS PADAVENSIS* *, n. sp. (Pl. XVI. fig. 1.)

No fewer than nineteen specimens of this fine new form were collected in King Island Bay. The larger specimens inhabit shells of *Pyrula vespertilio* and *Natica*, and the smaller occur in shells of *Melania*, *Ranella*, and *Cerithium*. *C. padavensis* belongs to the section of the genus which is characterized by the dactylopodites of the legs of the second and third pair being distinctly longer than the propodites. It appears to be closely allied to *C. longitarsis*, De Haan, a Japanese species, which, according to Heller and Hilgendorf, also inhabits the Indian Ocean. This new species, however, may at first sight be distinguished from *C. longitarsis* by its coloration, which presents a striking resemblance to *C. striolatus*, Dana. The latter form, however, differs from *C. padavensis* by its shorter, broader hands, the breadth of which slightly exceeds half their length, whereas in the Mergui species the hands are much more than twice as long as broad. *C. tæniatus*, M.-Edw., is readily distinguished by the longitudinal pale lines bordered with red on the upper surface of the cephalothorax and probably by other characters, as *e. g.* the absence of hairs on the lateral parts of the gastric region, &c. *C. lineatus*, M.-Edw., from the coast of Ecuador, is doubtless a distinct species.

I may add that I sent a specimen to Prof. Milne-Edwards, and that he informed me the species was unknown to him.

The anterior portion of the upper surface of the cephalothorax, which is bordered posteriorly by the cervical suture, is distinctly longer than broad, being, in an adult specimen, $10\frac{1}{2}$ millim. long (the median frontal tooth included) and 9 millim. broad. The gastric region is glabrous and marked with many small impressions, some of which are of an irregular form, whereas the others are round or oval. On each side of the gastric region the upper surface bears some small tufts of rather long yellow hairs, arranged in two or three longitudinal rows. Similar tufts of hair are also observed on the anterior half of the part of the cephalothorax which lies behind the cervical suture. The rostrum

* The name given to this new species is taken from Padaw, the native name of King Island

(or median frontal tooth) is small, triangular, depressed, narrow and subacute, but projects nevertheless a little more forwards than the lateral frontal teeth, which are triangular and obtuse. The external angles of the anterior margin of the cephalothorax are rounded. Immediately behind the frontal margin a transverse groove is seen close and parallel to it, bordering anteriorly the gastric region.

The eye-peduncles are very slender and distinctly longer than the breadth of the anterior margin of the cephalothorax, being almost twice as long as the distance between the two lateral frontal teeth. The cornea is small, scarcely measuring a twelfth of the length of the peduncle: but in younger specimens it is comparatively larger. The ophthalmic scales are narrow, dilated at their bases and armed at their distal ends with three or four acute teeth. The peduncles of the internal antennæ in the adult are scarcely longer than the eye-peduncles. The antennal peduncles are a little shorter than the eye-peduncles and their penultimate and antepenultimate joints are hairy, the latter joint being armed above at its outer angle with a hairy spine, which projects a little beyond the anterior end of the penultimate joint. The terminal joint is about as long as the two preceding taken together and is a little compressed. The flagella of the outer antennæ are naked.

The abdomen has the ordinary structure and form. The uropoda are asymmetrical and hairy along the margin of their terminal joint; the left is the larger. The external foot-jaws are about as long as the internal antennæ. The anterior legs are equal, and resemble those of *Clibanarius longitarsis*, de Haan. The slightly arcuate upper margins of the arms are unarmed and entire; the external margins of their under surfaces are armed at their distal ends with two small acute teeth, but their inner margins are unarmed and entire. The outer surfaces of the arms are covered with many short and small piliferous lines, their inner surfaces are nearly smooth and glabrous; and the smooth, unarmed under surfaces bear a few small tufts of yellow hairs. Similar hairs are also observed on the under surfaces of the basipodites and ischiopodites; their upper margins present also small transverse tufts of similar hairs. The upper margin of the wrist is armed, at its distal end, with a small, acute, dark-pointed spine, which is sometimes accompanied by a still smaller spinule

at its internal side. The remainder of the carpopodite is unarmed, with the exception of a few small tufts of hairs along its upper margin, and its outer and inner surfaces. The hands are comparatively elongate, being twice and a half as long as broad. The fingers are once and a third as long as the palm. The palm presents a few small spinules along the inner margin of its upper surface, but is covered otherwise only with some small piliferous lines. The smooth, flattened, and slightly hairy inner surface of the palm makes a right angle with the upper surface; the latter passes gradually into the outer surface, which presents some tufts of hairs, especially along its rounded under margin. The under surface of the palm is smooth and also a little hairy. The fingers have large, spoon-like excavated, horny tips of a black colour, meeting along their whole length, whereas the fingers have a small hiatus between them when closed. The mobile finger is covered on its upper margin with some spinules, a little larger than those of the palm, and arranged in two or three longitudinal rows. The immobile finger also presents similar, somewhat smaller spinules on its upper margin and on its outer surface; but the fingers are unarmed below. The fingers are everywhere rather hairy, the yellow hairs being mostly arranged in longitudinal rows of small transverse tufts. Each finger is armed at its base with two small, acute, conical teeth, situated near the upper margin of the internal cutting-surface, behind one another; the basal tooth, however, is much smaller than the other. The cutting-surfaces are smooth, presenting only a few small tufts of hairs.

The legs resemble those of *Olibanarius longitarsis*. Those of the second and third pairs are rather thinly clad with yellow hairs along their upper and under margins and at their articulations. The basal joints are unarmed, and the mero-podites present only a small acute spine at the distal ends of the under margins of their outer surfaces. The carpopodites are armed with a single, small, acute spine at the distal ends of their upper margins. The slender propodites are quite unarmed; those of the right legs are a little longer than those of the left. The slender, slightly arcuate dactylopodites are nearly once and a half as long as the propodites, when measured along their upper margins, and they terminate in short, black, acute points. They present a smooth, narrow, longitudinal ridge along their upper margins, and the distal halves of their under margins are

armed with a row of small black spinules. The outer and inner surfaces of these legs are smooth. The legs of the fourth pair are chelate and clothed with long yellow hairs along their upper and under margins. The more slender fifth legs are also very hairy.

This species is beautifully coloured. The cephalothorax and the postabdomen are of a uniform yellowish colour, and are never marked with red longitudinal lines. Each eye-peduncle is marked with three red longitudinal lines, one on its upper, one at its external, and one at its internal side. The antennulary and antennal peduncles are also marked with one or two red lines. The legs are of a white or pale yellowish colour, and marked with many longitudinal lines of dark red. The upper margins of the arms and of the wrists of the anterior legs are bordered on each side by a red line; these two red lines are continued along the inner margins of the upper surfaces of the hands. The outer and inner surfaces of the anterior legs are marked, moreover, with one or two often interrupted, red lines, which in very large individuals are rarely distinct. In order to give a good idea of the coloration of the legs of the second and third pair, I will first describe the coloration of the dactylopodites. On each side of the smooth dorsal ridge, which is white or of a pale yellowish colour, each dactylopodite is marked, on its outer as well as on its inner surface, with two red lines, separated from one another by an equally broad white or pale line. Interrupted traces of a fifth, much narrower line are observed along the under margin. These lines are continued on the propodites, but in such a manner that the two red lines which border the dorsal ridge of the dactylopodite are each divided on the propodites into two lines, which are separated by a rather broad pale yellowish space, and meet again at both ends. The inferior red line of the outer surface of the dactylopodite appears a little broader on the outer surface of the propodite, undivided on the propodites of the third pair, but with a narrow, pale, longitudinal space in its middle on those of the second pair; on the inner surface of the joints this line is, however, also divided into two narrow red lines, with a pale yellowish space between them. The under margin of the propodite is marked with a single red line, which, however, does not reach the proximal end. On the outer surface of the propodites of the legs of the third pair three red lines are therefore observed, besides the red line on the under margin of each, the

inferior one being the broadest and undivided (divided by a narrow white space on the propodites of the legs of the second pair); the two superior are narrow and separated by a broad white space, which is even broader than the white space between the middle line and the inferior one. These lines are continued, in the same manner, on the outer surface of the carpopodite, meropodite, and ischiopodite; whereas those of the inner surface are little distinct. The inferior line on the outer surface of the propodites of the legs of the third pair appears, however, to be constantly divided into two lines on the outer surface of the following joints, so that the outer surface of the carpopodites is marked with four narrow red lines, of which the two superior are separated from one another by the broadest white interspace and with a fifth red line near the under margin. The legs of the fourth pair also present some red lines.

In very young specimens the two red lines which are found on the outer and on the inner surfaces of the dactylopodite are not divided into secondary lines on the other joints, but are continued on them undivided.

Dimensions of an adult specimen:—

	millim.	
Length of the whole body.....	49	
Length of the cephalothorax	23	
Length of the postabdomen	26	
Length of the anterior part of the upper surface from tip of rostrum to the cervical suture	10 $\frac{1}{2}$	
Breadth of the anterior margin of the cephalothorax.	8 $\frac{1}{4}$	
Length of the eye-peduncles.....	9 $\frac{1}{2}$	
Length of the antennal peduncles	8	
Length of the anterior legs	35	
Length of the hands, the fingers included	14 $\frac{1}{4}$	
Breadth of the palm	5 $\frac{3}{4}$	
	Right leg of the third pair. millim.	Left leg of the third pair. millim.
Whole length of the legs	60	58
Length of the meropodites*	11	10 $\frac{1}{4}$
Length of the carpopodites	7 $\frac{1}{2}$	7 $\frac{1}{2}$
Length of the propodites	12 $\frac{1}{4}$	11
Length of the dactylopodites ..	18	18

* All the joints are measured along their upper margins. See the footnote on p. 255.

- B. Dactylopodites of the legs of the second and third pair shorter than the propodites, or at least appearing shorter when seen from above.

138. *CLIBANARIUS VIRESCENS*, *Krauss*.

Pagurus virescens, *Krauss*, *Südafrikanische Crustaceen*, 1843, p. 56, tab. iv. fig. 3.

Clibanarius virescens, *Hilgendorf*, *Crustaceen von Ost-Afrika*, 1869, p. 95.

Two specimens were collected at Owen Island. They are without shells. In structure they agree with all the essential characters of the finely-coloured *C. virescens*, *Krauss*, and are nearly similar in coloration to specimens of the species found on the coast of Natal, presenting only a few slight differences from *Krauss*'s description. The propodites of the legs of the second and third pairs, in these specimens, as in those from Natal, are of an olive-green colour; but in the Mergui specimens this colour is remarkably dark quite at the distal ends of the joints, and the latter are moreover marked at the distal ends of their outer surfaces with a small white spot. The dactylopodites of these legs are yellow-ochre, but are not marked with a green ring in the middle. The olive-green eye-peduncles are marked, on their uppersides, at their distal ends, with a narrow white ring before the cornea.

The cephalothorax of the larger specimen is 9 millim. long.

Clibanarius virescens has hitherto been recorded from the rocky coast of Natal, where it is a very common species, also from Zanzibar, the Red Sea (*Hilgendorf*), and Hongkong (*Heller*, *Novara-Reise*). This species is therefore probably distributed throughout all the Oriental seas.

139. *CLIBANARIUS ÆQUABILIS*, *Dana*, var. *MERGUIENSIS*, n.

Clibanarius æquabilis, *Dana*, *United States Expl. Exped.*, *Crustacea*, i. p. 464, pl. xxix. fig. 4.

Clibanarius æquabilis, *Heller*, *Crustaceen der Novara-Reise*, S. 91.

Twenty-four specimens were collected at King Island Bay, inhabiting shells of *Nerita* and *Cerithium*.

Many years ago *Dana* described and figured two species of the genus *Clibanarius* which are closely allied to one another. One of these species, *C. æquabilis*, was discovered at the Island of Madeira; the other, however, which was called *C. zebra*, inhabits

the seas of the Sandwich Islands. *C. æquabilis* was afterwards collected on the coast of Chili ('Novara' Expedition); so we may conclude that this species inhabits the Atlantic Ocean, and *C. zebra* the Pacific. Stimpson described, in 1858, a third species, *C. pacificus*, from Japan. Although closely allied to *C. æquabilis*, it differs from it in the dactylopodites of its ambulatory legs being longer. The Mergui specimens seem to belong to Dana's *C. æquabilis*, as they nearly completely agree with the diagnosis in his 'Conspectus,' and with his figures. The few remarks of Heller on specimens from Chili are also applicable to these individuals. Nevertheless, I anticipate that Mergui specimens will present some slight differences from Madeira individuals, when the two are compared together. I propose therefore to describe them as a variety *merguiensis*. *C. zebra* apparently differs from these specimens in its coloration, its ambulatory legs being longitudinally striated.

All these specimens, like those collected on the coast of Chili by the 'Novara' Expedition, are of a small size, and scarcely exceed 15 millim. in length. The cephalothorax has a length of 9 millim.; its anterior part, which is bordered posteriorly by the cervical suture, is $4\frac{1}{2}$ millim. long and $4\frac{1}{4}$ millim. broad. The upper surface of the cephalothorax is rather coarsely punctate, especially the anterior part, the lateral margins of which are clothed with some yellow hairs. The median frontal tooth is small, acute, and projects a little more forwards than the lateral frontal teeth, which are found just outside the bases of the eye-peduncles; in Dana's great work (*l. c.* fig. 4 *d*) the median frontal tooth appears scarcely as prominent as in these specimens. The lateral angles of the anterior margin are rounded. The slender eye-peduncles are scarcely longer than the anterior width of the cephalothorax; they are a little longer than the peduncles of the external antennæ, and also surpass with the cornea the peduncles of the internal antennæ. The small basal scales are armed anteriorly with four or five small acute teeth.

The anterior legs are closely similar to those of *Clibanarius æquabilis*, Dana, *l. c.*, fig. 4, *b, c*, and, in a lateral view, also to those of *C. corallinus*, Dana (*l. c.* fig. 8 *c*). The merus-joints are armed with one or two minute, acute teeth at the distal end of the under margin of their outer surface; the anterior margin of the outer surface (not the upper margin), which in *C. corallinus*,

Dana, is minutely denticulate along its whole length, is quite entire in these specimens. The wrist is armed with an acute spine at the distal end of the inner margin of the upper surface; the latter is somewhat uneven, and clothed with some yellow hairs. The hands perfectly resemble those of *C. æquabilis*, *C. corallinus*, and *C. zebra*, as regards their form and size; their upper surface is nearly twice as long as broad (the fingers included), and the palm is considerably swollen below. The inner margin of the upper surface of the palm is armed with a row of four or five acute teeth, and the upper surface is covered with some more or less acute tubercles or teeth. These tubercles are more numerous and more acute on the fingers, which have spoon-like excavated tips, and are armed with two or three rather strong teeth along their inner edges. The convex under surface of the hands is rather smooth. The hands and the fingers are rather hairy above and a little so below.

The legs of the second and of the third pairs have a smooth, never granular, surface, which, however, presents many small impressions, in which the hairs with which the legs are clothed are implanted. The meropodites of these legs are armed with one or two acute spinules at the distal ends of the inferior margins of their outer surfaces; the carpopodites present a similar acute spinule at the distal ends of their upper margins. The propodites are unarmed; those of the legs of the second pair and those of the right leg of the third pair have the usual cylindrical form, their outer surfaces being rather convex; the propodite of the left leg of the third pair, on the contrary, has a somewhat trihedral form, its outer surface being remarkably flattened, so that the upper margin is rather acute. If Dana's figure, 4*f*, of this joint is exact, then these specimens somewhat differ from the Madeira type: in the latter this joint is rather slender, the outer surface being a little more than three times as long as high, and with nearly straight margins; whilst in the Mergui specimens the outer surface is only a little more than twice as long as high and is bordered by a slightly arcuate upper margin. The dactylopodites are compressed, with somewhat convex outer and inner surfaces, except the dactylopodite of the left leg of the third pair, the outer surface of which is flattened or even slightly concave. The dactylopodites of these two pairs of legs are all shorter than the propodites, measuring

about three fourths of the latter; they terminate in a black pointed tip, and are armed along their under margin with a row of five or six acute spinules. These legs are hairy along their upper and under margins, and the two posterior legs are also hairy.

They present the following coloration :—The cephalothorax is of a uniform yellowish colour, and not marked with longitudinal lines. The eye-peduncles are each marked above with a red longitudinal line, which in most specimens, however, is no longer visible in consequence of the action of the alcohol. The anterior legs are yellowish red, the teeth and tubercles with which they are covered being yellowish white. The coloration of the propodites and dactylopodites of the legs of the second and of the third pairs is very characteristic. These legs present the same yellowish-red colour as the chelipedes; the outer and inner surfaces of the dactylopodites are, however, of a yellowish white, so that the upper margin is red and the under margin often so. The white colour of the dactylopodites extends more or less upon the outer and inner or upper surfaces of the propodites, but much further upon the propodites of the third pair than upon those of the second pair, often reaching in the former to the proximal end of these joints. The meropodites and carpopodites of the legs of the third pair also often present a yellowish-white spot on their outer surfaces, but not sharply defined. The specimens which were collected in the seas of Chili presented, according to Heller, the same remarkable coloration.

If this species should prove to be distinct from *C. æquabilis*, Dana, of the Atlantic region, I propose for it the name of *C. merquiensis*. It may be distinguished, at first sight, from the other *Clibanarii* of the Indian seas by the coloration of its legs.

140. *CLIBANARIUS CRUENTATUS*, *M.-Edw.*

Pagurus cruentatus, *Milne-Edwards*, *Ann. Sci. Nat.* t. x. 1848, p. 62.

Clibanarius cruentatus, *Filhol*, *Mission de l'île Campbell* (Paris, 1885), p. 424, pl. lii. fig. 4.

One young specimen was found at King Island Bay. This little animal, whose cephalothorax is only $6\frac{1}{2}$ millim. long, is one of those species in which the dactylopodites of the second and

third legs are shorter than the propodites. It therefore somewhat resembles *C. æquabilis*; but may be recognized at first sight by its remarkable and beautiful coloration. The gastric region of the upper surface, which is about as long as broad, has a yellowish-red ground-colour, marked with some yellowish-white spots, viz. one spot in the middle anteriorly and six on each side, arranged in two longitudinal rows behind one another. The median frontal tooth is acute, triangular, and projects more forwards than the lateral frontal teeth situated just outside the bases of the eye-peduncles; the median tooth is yellowish white. The slender eye-peduncles are a little longer than the anterior breadth of the cephalothorax, and scarcely more than twice as long as the distance between the lateral frontal teeth. The basal scales are very small and slightly denticulate. The eye-peduncles are somewhat longer than the peduncles of the external antennæ, and surpass the peduncles of the internal antennæ by half the length of the cornea. The peduncles of the external antennæ are yellowish red, and marked with yellowish-white spots. The three anterior pairs of legs are of a beautiful red colour, and covered everywhere with rather large, round, often confluent, yellowish-white spots; the fingers of the chelipedes are more white than red, the former colour being preponderant. The merus-joints of the anterior legs are armed with one or two acute spinules at the distal ends of the under margins of their outer surfaces; each carpopodite presents an acute spine at the distal end of the inner margin of the upper surface, which is otherwise unarmed and smooth. The hands are equal, and their upper surfaces are a little more than twice as long as broad (the fingers being included); the inner margin of the upper surface of the palm is armed with three or four acute spines or teeth, and the upper surfaces of the palm and fingers present a small number of similar acute spines or teeth. The fingers are somewhat denticulate along their inner margins, and have black spoon-like excavated tips.

The meropodites of the second pair of legs are armed with a small acute spinule at the distal ends of the under margins of their outer surface; the carpopodites of the second and third pairs present a strong spine at the distal ends of their upper margin. The dactylopodites of the second and third pairs of legs are shorter than the propodites; they are slender, terminate in rather long black tips, and are armed along their under

margins with small acute spinules. The dactylopodite and propodite of the left leg of the third pair are somewhat flattened on their outer surfaces. The legs are clothed with yellowish hairs. The spinules which are found on the legs are all of a yellowish-white colour, similar to the spots with which the legs are covered. Otherwise the legs are smooth and shining.

141. CLIBANARIUS *ARETHUSA* *, n. sp.

A female specimen was collected in King Island Bay. This species belongs, like the three preceding, to that section of the genus in which the dactylopodites of the second and third legs appear to be shorter, or scarcely as long, but never longer than the propodites, when seen from above; and it is most closely allied to *C. carnifex*, Heller, from the Red Sea, and to the form which I have described above as *C. æquabilis*, var. *merguiensis*. This specimen is nearly twice as large as the specimens of *C. æquabilis*, var. *merguiensis*. As regards the shape and the structure of the cephalothorax and of the postabdomen, *C. Arethusa* closely agrees with that species; but the gastric region is more sparsely and a little less coarsely punctate; the anterior part of the upper surface of the cephalothorax, which lies before the cervical suture, presents some small transverse tufts of rather short yellow hairs except in the middle, and some similar small transverse tufts are also observed immediately behind the cervical suture. The form of the anterior margin of the cephalothorax is completely similar to that of *C. æquabilis*, var. *merguiensis*, the triangular, acute, median tooth projecting a little more forwards than the lateral frontal teeth. The median frontal tooth presents no short ridge above, directed backwards, as in Heller's *C. carnifex*. The slender eye-peduncles are distinctly longer than the anterior breadth of the cephalothorax; they are also much longer than the peduncles of the external antennæ, and quite as long as the peduncles of the internal antennæ. The somewhat hairy ophthalmic scales are very small, narrow, triangular, and armed with two or three small teeth at their tips; they are comparatively smaller than those of *C. æquabilis*, var. *merguiensis*, and are more distant from one another. The external antennæ are similar to those of *C. carnifex* and *C. æquabilis*; the aciculum with which the penultimate joint of their peduncle is armed at

* *Arethusa*, one of the Hesperids.

its base, which also presents three or four minute spinules along its inner or median margin, does not project beyond the distal end of the penultimate joint, whereas in *C. carnifex* it reaches to the middle of the terminal joint. The penultimate joint is armed with a minute spinule at the outer angle of its distal end. The two basal joints are very hairy, and the flagella are rather short, being scarcely as long as the cephalothorax.

The legs are similar to those of *C. æquabilis*, var. *merguiensis*, and probably resemble still more those of *C. carnifex*. The anterior legs are equal and quite similar to those of *C. æquabilis*, var. *merguiensis*, even as regards the distribution of the spinules with which the chelipedes are armed, and hairs with which they are covered. In *C. carnifex* the upper margin of the hands is prominent, like a crest, and armed with four or five acute spinules. In this species such a crest is not found; the hands are scarcely more than twice as long as broad, the inner margin of the upper surface of the palm is not at all prominent, and armed with three or four spinules which are not larger than those of the rest of the upper surface of the palm. The legs of the second pair are similar to those of *C. æquabilis*, var. *merguiensis*, and probably still more resemble those of *C. carnifex*, Heller. These legs have a completely smooth surface, presenting no other punctations than those in which the short hairs are implanted, and which are rather thinly distributed. The propodite of the left leg of the third pair is a little shorter than that of the right, and a little depressed on its outer surface; this outer surface still appears, however, slightly convex. In *C. æquabilis*, var. *merguiensis*, the outer surface of this propodite is much more depressed; so that it appears perfectly flattened, and the upper margin of the outer surface is subacute. The dactylopodites finally are comparatively longer than those of *C. æquabilis*, var. *merguiensis*, and are scarcely as much compressed; they terminate, as in this species, in curved, black, pointed tips, and are armed, on their under margins, with a row of seven or eight acute spinules. As I have already observed, the legs of the second and of the third pairs are thinly clothed with short, stiff hairs arranged in small tufts; those of the fourth pair, on the contrary, are densely clothed with much longer hairs along their margins; and those of the fifth are, again, less hairy. As regards the two or three spinules with which the meropodites are

armed, this species completely agrees with *C. æquabilis*, var. *merguiensis*.

Although preserved in spirit, this *Clibanarius* still presents the following characteristic coloration. The anterior part of the cephalothorax lying before the cervical suture is of a uniform greyish ground-colour, presenting, however, faint traces of the red colour of the legs; in the living animal the greyish colour will therefore certainly appear to be mixed with some red. The eye-peduncles and the ophthalmic scales are of an orange-red colour; the corneæ are black and separated from the red colour of the peduncles by a small white ring. The peduncles of the antennæ and antennules are of the same red, whereas the flagella of the outer antennæ are almost uncoloured. The legs are all of an intense orange-red colour, and present even no trace of the white spots which are characteristic of *C. carnifex*, Heller, from the Red Sea, and *C. cruentatus*, M.-Edw., from New Zealand; and whereas the propodites and dactylopodites of the second and third legs of *C. æquabilis*, var. *merguiensis*, are marked, to a certain extent, with a characteristic yellowish white, no trace of this colour is observed on these joints in this species, in which they present the same orange-red colour as the other joints. The excavated horny tips of the fingers and the acute tips of the dactylopodites are black.

Dimensions.

	millim.
Length of the whole body	46
Length of the cephalothorax	16
Length of the abdomen, measured along its upper margin	30
Length of the anterior part of the cephalothorax which lies before the cervical suture	$7\frac{1}{2}$
Breadth of the anterior margin of the cephalothorax.	$5\frac{1}{4}$
Length of the eye-peduncles	$6\frac{1}{4}$
Length of the antennal peduncles	5
Length of the antennular peduncles	$6\frac{1}{2}$
Length of the hands	7
Breadth of the hands	$3\frac{1}{5}$

Length of the last four joints of the second and third legs:—

	Right leg of the 2nd pair. mm.	Right leg of the 3rd pair. mm.	Left leg of the 2nd pair. mm.	Left leg of the 3rd pair. mm.
Meropodites *	$7\frac{1}{4}$	$7\frac{1}{4}$	$6\frac{1}{3}$	$6\frac{1}{2}$
Carpodites	$4\frac{1}{2}$	$4\frac{3}{4}$	4	$4\frac{1}{2}$
Propodites	7	$7\frac{1}{4}$	$5\frac{2}{3}$	$6\frac{1}{2}$
Dactylopodites	7	$7\frac{3}{4}$	$6\frac{1}{4}$	$7\frac{1}{4}$

As these dimensions show, the right legs are longer than the left; the right leg of the third pair is the longest of all, and the left leg of the second pair the shortest. The propodites of the two right legs have nearly the same length, those of the two left legs are unequal, the propodite of the left leg of the third pair being a little longer and stronger. Except in the right leg of the second pair, the dactylopodites are slightly longer than the propodites; the dactylopodite of the right leg of the third pair is the longest, the dactylopodite of the left leg of the second pair the shortest of all; and the dactylopodites of the right leg of the second pair and of the left leg of the third pair are almost of the same length.

Genus CENOBITA, Latr.

142. CENOBITA VIOLASCENS, Heller.

Cenobita violascens, Heller, *Crustaceen der Novara-Reise*, p. 82, Taf. vii. fig. 1.

Four specimens were collected. One, inhabiting the shell of a *Turbo*, is adult, and was found in King Island Bay; the other three, one of which is in a shell of *Eburna*, are from Sullivan Island.

According to Mr. Miers ('Annals and Magazine of Natural History' for May 1880, p. 32), this species is probably identical with *Cenobita compressa*, M.-Edw. I believe he is right.

Cenobita violascens was discovered in the Nicobar Islands by the 'Novara' Expedition.

* These joints were measured along their upper margins; all the dactylopodites, when seen from above, seem to be shorter than the propodites, because their tips are downwardly curved; but the real length of their upper margins, the tips included, are given in this Table; and this length, as a matter of fact, exceeds, in some dactylopodites, the length of the upper margin of the corresponding propodites.

Tribe MACRURA.

Family GEBIDÆ.

Genus GEBIA, *Leach*.143. GEBIA CARINICAUDA, *Stimpson*.

Gebia carinicauda, *Stimps. Proc. Acad. Nat. Sci. Philadelphia*, 1860, p. 23.

Gebia carinicauda, *Miers, Zoology of the Voyage of H.M.S. 'Alert,'* 1884, p. 280.

A young male specimen was collected at Elphinstone Island. It is only 21 millim. long, whereas adults of the species attain to double the length. In both hands the lower margin of the palm bears a small acute spine at the base of the immobile finger, the latter being scarcely half as long as the mobile finger. The ischiopodites of the anterior legs are armed with two spines. The meropodites of the legs of the first and second pairs are armed with a small spine at their distal ends, and the under margins of those of the chelipedes are also somewhat spinulose. There is a short spine at the base of the legs of the second and third pairs. The antero-lateral margin of the carapace is armed with a small spine between the front and the insertion of the peduncle of the external antennæ. The form of the last post-abdominal segment is also distinctive of the species, as it is nearly quadrate, and provided with a transverse crest at a small distance from the anterior margin, and its posterior margin is distinctly narrower than the latter.

I suppose *Gebia hirtifrons*, White, to be a different species, distinguished by the lower margin of the palm not being toothed, and by a somewhat different form of the terminal postabdominal segment, the posterior margin of which has nearly the same breadth as the anterior. The terminal postabdominal segment of *G. maior*, de Haan, is also distinctly broader than long.

Gebia carinicauda has hitherto been recorded from Hongkong and from North Australia; so I conclude that it is distributed throughout the whole Malayan Archipelago.

Genus GEBIOPSIS, *A. M.-Edw.*

144. GEBIOPSIS INTERMEDIA, n. sp. (Pl. XVI. fig. 2.)

Four adult specimens (2 ♀, 2 ♂) are in the collection, and were found at Elphinstone Island.

I name this species *G. intermedia* because in many of its cha-

racters it forms a remarkable transition between the two hitherto known species of the genus *Gebiopsis*, viz. *G. nitida*, A. M.-Edw., from the Cape Verde Islands, and *G. Darwinii*, Miers, from the seas of Australia*.

This new species may be distinguished from *G. Darwinii*, (1) by the comparatively longer peduncles of the internal and external antennæ, (2) by the meropodites of the chelipedes being armed with a row of minute, acute spinules along their infero-internal margins, (3) by the carpopodites of the chelipedes being armed with two strong spines, and (4) by the shape of the last pair of ambulatory legs, which more resemble those of a true *Gebia*.

G. intermedia may be seen at first sight to differ from *G. nitida* by the much shorter peduncles of the internal and external antennæ, and by many other characters. In its general appearance, however, it much resembles that species, not only as regards the body, but also in the shape and the structure of its legs, which is seen on comparing it with the figure of that species in the 'Nouvelles Archives.' The front is very short, horizontal, not at all deflexed, and projects but little beyond the short thick eye-peduncles, of which only the corneæ are visible when seen from above. The front is armed with four equidistant, short, equal, and acute spinules on its anterior margin. The front and the larger anterior half of the gastric region are densely covered with tufts of short hairs, between which they are armed with many acute spinules and granules; the lateral margins of the gastric region are also armed on each side with a row of 14-15 small acute teeth, which gradually increase in size anteriorly, so that the anterior teeth are much larger than the posterior. The cervical suture is broad and deep, and, on each side, the gastric region is bordered by a rather deep longitudinal groove, immediately below and parallel to the rows of small teeth which issue posteriorly into the cervical suture. Behind the cervical suture the dorsal surface of the carapace is smooth in the middle and a little rugose on the sides; its posterior margin is fringed with short hairs. The segments of the postabdomen are smooth, but somewhat hairy

* Miers (Zoology of the Voyage of H.M.S. 'Alert') mentions another species from the Australian seas, which he proposes to designate *Gebiopsis Bowerbankii*, if specifically distinct; this form, however, seems only to differ from *G. Darwinii* in the armature of the front.

on the sides. The terminal segment exactly resembles that of *Gebiopsis Darwinii* in its general form, having the posterior margin nearly straight, unarmed, and fringed with hairs. The upper surface of this segment bears on each side a longitudinal ridge parallel to its lateral margins; and these two ridges are united by a transverse ridge situated at some distance from but parallel to the anterior margin. Three longitudinal grooves occur on the area defined by these ridges, namely, one in the middle and one on each side, close to the ridges. The elevated parts of the upper surface of the segment are more or less distinctly transversely rugose.

The internal antennæ are shorter than those of *G. nitida* from the Cape Verde Islands, but longer than those of *G. Darwinii*: as in *G. nitida* the terminal joints of the peduncles project beyond the front; but in *G. intermedia* they are much shorter, scarcely measuring more than a fourth of the length of the gastric region. The peduncle bears two subequal flagella, of which the interior one is a little longer and much thicker than the other. The external antennæ are a little longer than the carapace, and are similar to those of *G. Darwinii*. Their peduncles are scarcely longer than those of the internal antennæ, and their joints are short, resembling those of the species from Port Darwin; the antepenultimate joint is armed at the distal end of its upper margin with a minute spinule, and the last two joints are clothed above with long hairs. The outer maxillipeds project somewhat more forwards than the peduncle of the external antennæ.

The chelipedes are equal to one another and about once and a half as long as the carapace; in their outer appearance they seem to resemble those of the species from the Cape Verde Islands. The laterally compressed meropodites project nearly as much forwards as the peduncles of the internal antennæ; they are everywhere smooth and glabrous, except the internal margins of their narrow under surfaces, which are armed along their whole lengths with a row of minute equal spinules, about 25-30 in number, and fringed with very long hairs. Some few short hairs are also found along the external margins of their under surfaces and at the distal ends of their upper surfaces. The wrists are short, and armed with two rather strong, acute, subequal spines, one at the distal end of the upper margin, and the other at the distal end of the under margin; the latter some-

times bears another much shorter spinule at its base, which, however, is often indistinct. The upper surface of the wrist is covered with two rows of hairs, and some hairs are also found on its under surface. The hands are a little distorted, but otherwise seem to resemble those of *Gebiopsis nitida*. They are as broad at their proximal halves as the meropodites, and the fingers are much shorter than the palm, being only half as long. The palm, rounded above and below, is smooth and unarmed, but clothed with hairs, some of which are arranged in longitudinal, often oblique, rows. The equally long fingers cross one another with their pointed tips when closed; the mobile finger is strongly curved, very hairy, and armed at the base of its inner margin with a small tooth, whereas the immobile finger is nearly glabrous and minutely denticulate along its inner margin.

The second legs resemble those of *G. nitida*; the meropodites, which are much narrower than those of the chelipedes, are fringed with long hairs along their inferior margins; the propodites are a little longer than the carpopodites, and nearly three times as long as the dactylopodites, which are therefore apparently shorter than those of *G. nitida*, but about the same size as those of *G. Darwinii*. The upper margin of each carpopodite and propodite, and also the under margin of the latter, is fringed with long hairs, similar to those of the inferior margin of the meropodites; each dactylopodite is also hairy.

The meropodites of the third pair of legs are, again, narrower than those of the second pair (in the species from the Cape Verde Islands, on the contrary, they are figured as being broader) and nearly glabrous, being not fringed with long hairs; the carpopodites of these legs are a little longer than the propodites and somewhat hairy at their distal ends. The outer surfaces of the compressed propodites are covered with two dense rows of hairs; and each of these joints is, moreover, clothed with a dense tuft of hairs at the distal end of their under margin, and with a few hairs along its upper margin. The hairy dactylopodites are a little more than half as long as the propodites. The equally compressed propodites of the fourth pair of legs are a little shorter than the carpopodites and scarcely longer than the dactylopodites; and the outer surface of each is also covered with two dense rows of hairs, as on the propodites of the third pair, and a similar dense tuft of hairs is found at the distal end of the under margin of each.

The last pair of legs of this species are very characteristic, and more resemble those of the proper *Gebiæ*, the propodites being slender and not compressed. They are, moreover, subcheliform, the inferior margin of each propodite being prolonged into an acute immobile finger, which, however, is much shorter than the dactylopodite. Their somewhat thickened meropodites are even a little shorter than each of the two following joints, and the carpopodites are nearly as long as the propodites, whereas they are almost twice as long as the latter in *G. Darwinii*. The dactylopodites measure nearly half the length of the propodites. The meropodites, carpopodites, and propodites of these legs are a little curved; the meropodites are glabrous, the carpopodites clothed with a tuft of hairs at the distal ends of their upper margins, and the propodites are clothed with hairs in the same manner as the legs of the third and fourth pairs.

The rami of the uropoda are broad, and resemble those of *G. Darwinii*. They are as long as the terminal segment of the postabdomen, and their posterior margin, like the external margin of the outer rami, is fringed with hairs; the upper surfaces of the outer rami present two longitudinal ridges proceeding from the base of the joint to the posterior margin, and that of the inner rami one ridge.

The largest specimen, a male, is 39 millim. long from the tip of the front to the posterior margin of the terminal postabdominal segment; the cephalothorax of this specimen is $12\frac{1}{2}$ millim. long, and the chelipedes measure 19 millim.

Family THALASSINIDÆ.

Genus THALASSINA, Latr.

145. THALASSINA ANOMALA, *Herbst*.

Cancer anomalus, *Herbst*, *Krabben und Krebse*, iii. p. 45, Taf. lxii. (1803).

Thalassina scorpionides, *Latreille*, *Gen. Crust. et Ins.* i. p. 51 (1807), *nec Guérin et Milne-Edwards*.—See *Steenstrup et Lütken*, *Videnskabelige Meddelelser*, p. 257.

One old specimen was collected at Mergui, where the species is very common. In it the distance of the tip of the beak to

the end of the terminal segment measures about 27 centim. The hands are nearly equal in shape and size, and the cardiac region is armed with some spines.

Thalassina anomala has been recorded from the Nicobar Islands, Java, Borneo, the Philippine and Fiji Islands.

Family SCYLLARIDÆ.

Genus THENUS, *Leach*.

146. THENUS ORIENTALIS, *Fabr.*

Scyllarus orientalis, *Fabricius, Suppl. Entom.* p. 399.

Thenus orientalis, *Milne-Edwards, Hist. Nat. des Crustacés*, p. 286; *Desmarest, Considérations sur la Classe des Crustacés*, pl. xxxi. fig. 1.

Five specimens were collected in the Mergui seas.

Thenus orientalis inhabits the Indian Ocean.

Family ALPHEIDÆ.

Genus ALPHEUS, *Fabr.*

147. ALPHEUS BREVIROSTRIS, *Oliv.*

Palæmon brevirostris, *Olivier, Encyclop. Méthodique*, t. viii. p. 664, pl. 319. fig. 4.

Alpheus brevirostris, *Milne-Edwards, Hist. Nat. des Crustacés*, t. ii. p. 350.

Alpheus malabaricus, *Hilgendorf, Monatsber. d. k. preuss. Akad. d. Wiss. Berlin*, Nov. 1878, p. 832 (nec *Alpheus malabaricus*, de Haan).

An adult specimen was collected at Elphinstone Island, and a young one in King Island Bay.

This species is most closely allied to *Alpheus malabaricus* (Fabr.), de Haan, and *A. Kingsleyi*, Miers, both from Japan. These three species form a small section of the genus, which may be distinguished from the other species of *Alpheus* with a spiniform rostrum, rounded ocular hoods, and having the basal joint of the outer antennæ without an external spine, by the upper margin of the larger hand being notched, and by the lower being entire. Mr. Kingsley is wrong in uniting *A. rapax* (Fabr.), de Haan, to this section, as in it both margins of the larger hand are entire.

The larger specimen is 66 millim. long from the tip of the rostrum to the end of the terminal segment of the abdomen. The first (*i. e.* the anterior) joint of the internal antennæ measures only a third of the length of the second joint, and the latter is twice as long as the third or antepenultimate joint. The antennal scale is a little longer than the peduncle of the internal antennæ, the difference in length being almost equal to the length of the first (anterior) joint of the antennules; the peduncle of the external antennæ is also shorter than the antennal scale.

The rostrum is acute and short, not reaching as far forwards as the anterior end of the antepenultimate (or third) joint of the antennules; between the eyes it is very narrow, linear, and carinate, being separated from the eyes by rather deep depressions in the surface of the carapace. The rostrum extends but little backwards behind the eyes, so that its whole length scarcely measures a fifth of the length of the carapace. The outer maxillipeds, clothed with long hairs at their extremities, project much beyond the antennal scales, almost reaching to the middle of the thickened portion of the outer (upper) flagella of the internal antennæ.

The larger chelipede, situated on the left side and about 50 millim. long, is more than twice as long as the carapace, but shorter than the distance from the tip of rostrum to the end of the terminal segment of the abdomen. The upper margin of the arm, in both chelipedes, is unarmed, and never presents a spine at its distal end; the inner margin of the under surface, however, presents some small acute teeth along its whole length, the distal one of which is the longest of all, especially on the larger (or left) chelipede. The larger hand, which is almost three times as long as broad, and which measures 30 millim., is strongly compressed laterally, and has a prismatic form. The fingers are distinctly shorter than the palm; the mobile finger measures 13 millim., and the upper margin of the palm 17 millim., so that the fingers are a little shorter than half the length of the whole hand. The outer surface of the palm is smooth and glabrous, and has no longitudinal crests, although it appears slightly concave at the base of the immobile finger. The inner surface of the palm is also smooth, but is clothed with some hairs, especially along its upper and under margins. The upper margin of the palm is

flattened, especially on its distal half, and is bordered by two longitudinal and parallel crests, of which the external one, however, scarcely extends proximally beyond the oblique impressed line at the base of the outer surface of the hand, whereas the internal crest is a little longer. Immediately before the articulation of the mobile finger, a small transverse groove occurs on the upper surface of the palm, as in *Alpheus malabaricus* (Fabr.), de Haan. The under, like the upper, margin of the palm is flattened; so that an under surface may be spoken of. As already observed, the inner margin of this under surface is bordered with rather long hairs. The mobile finger is strongly compressed laterally, and is broad and bluntly rounded at its distal extremity; the elevated proximal half of the inner margin of the immobile finger is fringed with rather long hairs on the inner side of the hand, and the outer and inner surfaces of the fingers are also a little hairy.

The other leg measures 39 millim., is much shorter than the former, and scarcely twice as long as the carapace. The hand of this smaller chelipede is $22\frac{1}{2}$ millim. long, the palm measuring $8\frac{1}{2}$ millim., so that the fingers are only once and a half as long as the palm. The palm is compressed and fringed with long hairs along the upper and under margins of its inner surface; the fingers are slightly arcuated and present a space between their inner margins, which are densely clothed with rather long hairs, and the tips cross when closed.

The joints of the carpus of the second pair of legs are respectively $4\frac{3}{4}$, $3\frac{3}{4}$, $1\frac{1}{5}$, $1\frac{1}{5}$, and $1\frac{2}{5}$ millim. long; the first or proximal joint is therefore the longest of all, and even a little longer than the second, and the latter is nearly as long as the three distal joints together.

The younger specimen, which is only 34 millim. long from the tip of the rostrum to the end of the terminal segment of the abdomen, presents only two slight differences from the adult worthy of notice. The rostrum, as in the adult *Alpheus rapax* (Fabr.), de Haan, extends backwards nearly to the middle of the carapace, and the antennal scales scarcely project beyond the peduncles of the internal antennæ. This specimen in other respects perfectly resembles the adult.

This species is closely allied to the Japanese *Alpheus malabaricus* (Fabr.), de Haan, and *A. Kingsleyi*, Miers. It differs at

first sight from *A. malabaricus*, as described in the 'Fauna Japonica,' by the absence of the longitudinal crests on the outer surface of the larger hand, and by the fingers of the smaller hand being comparatively shorter in proportion to the length of the palm. In *Alpheus Kingsleyi*, Miers, the fingers of the larger hand are nearly as long as the palm, those of the smaller chelipede about twice as long as the palm, and the upper surface of the palm of the larger hand does not present the characteristic crests of *A. brevirostris*.

A. brevirostris appears to inhabit the Indian Ocean, having been collected by Péron on the coast of New Holland and at Zanzibar by Peters, according to Dr. Hilgendorf, who, however, was wrong in referring it to de Haan's *A. malabaricus*.

I am more inclined to refer de Haan's *A. malabaricus* to the *malabaricus* of Fabricius than the *A. brevirostris*, as that part of Fabricius's description of his species, viz. "palma minuta, digitis longissimis," is much more applicable to the species which was described by de Haan than to *A. brevirostris*. Nevertheless I am not aware whether the species described in the 'Fauna Japonica' under the name of *A. malabaricus* really occurs in the Indian Seas.

148. *ALPHEUS RAPAX* (Fabr.), de Haan.

Alpheus rapax, de Haan, *Fauna Japonica*, *Crustacea*, p. 177, tab. xlv. fig. 2.

A fine, nearly adult specimen was collected in King Island Bay.

Though closely allied to the preceding species, *A. rapax* of the 'Fauna Japonica' may be distinguished from it by the following characters:—The rostrum, even in the adult, extends backwards to the middle of the carapace. The arms of both chelipedes are armed with an acute spine at their distal ends, both margins of the palm of the larger hand are entire (as may also be distinctly seen in de Haan's figure), and the fingers of the smaller hand are somewhat longer in proportion to the palm, being twice and a half as long as the palm in the adult, whereas in *A. brevirostris* they measure only once and a half the length of the palm. Finally, it is not the first joint of the carpus of the legs of the second pair that is the longest

of all, but the second joint. In other respects this species almost completely resembles *A. brevirostris*, for the crests with which the outer surface of the larger hand should be provided, according to the author of the 'Fauna Japonica,' may be perhaps visible in very old specimens; in younger individuals, such as the one before me, they are, however, rather indistinct. De Haan himself describes the upper crest of the outer surface as "valde obtusa evanida."

The specimen is 55 millim. long from the tip of the rostrum to the end of the terminal segment of the abdomen, and had doubtless not yet reached its full size. The rostrum extends nearly to the middle of the carapace; its acute tip projects nearly as much forwards as in *A. brevirostris*, scarcely reaching beyond the middle of the antepenultimate joint of the peduncle of the internal antennæ. The rostrum is acute between the eyes, and is separated from them by rather deep depressions; behind the eyes, however, the rostrum is not acute, but rather obtuse. As regards the length of the joints of the internal antennæ, *A. rapax* fully agrees with *A. brevirostris*; the scale of the external antennæ in the specimen scarcely projects beyond the peduncle of the internal antennæ. The outer maxillipeds resemble those of *A. brevirostris*, and equally project forwards.

The right chelipede is the larger, as in the figure of the 'Fauna Japonica,' and is 39 millim. long. It therefore appears more than twice as long as the carapace, but shorter than the whole body—quite as in *A. brevirostris*. The upper margin of the arm of each chelipede is armed with a small acute spine at its distal end; the inner margin of the upper surface presents some small teeth, of which the distal one is the longest, resembling those of the preceding species. The larger hand is $22\frac{1}{2}$ millim. long, and $7\frac{3}{4}$ millim. broad near its base, so that it is about three times as long as broad; also in the length of the fingers this species agrees with *A. brevirostris*. The shape of the larger hand is nearly quite the same in both species, but in *A. rapax* no transverse groove is found on its upper surface, close to the articulation of the mobile finger. I may add that in this specimen the inner surface of the palm is nearly glabrous.

The smaller hand is similar to that of *A. brevirostris*, but the palm is comparatively shorter in proportion to the length of the fingers, the whole hand being $18\frac{1}{2}$ millim. long, the upper

margin of the palm $5\frac{1}{2}$ millim., and the fingers 13 millim.; in this specimen the fingers therefore are more than twice as long as the palm.

The joints of the carpus of the legs of the second pair are respectively $3\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{3}{4}$, $1\frac{1}{2}$, and $1\frac{1}{5}$ millim. long; the second joint therefore is the longest of all, and even a little longer than the first. This fact is clearly recognizable in the figure in the 'Fauna Japonica.' Mr. de Haan was probably right in identifying his specimens with the species of Fabricius, the diagnosis of the latter agreeing also perfectly with this specimen.

A. rapax is a rather rare species, inhabiting the Indian Ocean, and the seas of China (*Stimpson*) and Japan (*de Haan*).

149. ALPHEUS EDWARDSII, *Aud.*

Athanasus Edwardsii, *Audouin, Explication planches de Savigny, Description de l'Egypte, Atlas*, pl. x. fig. 1.

Alpheus avarus, *de Haan (nec Fabricius), Crustacea, Fauna Japonica*, p. 179, pl. xlv. fig. 3 (*Alpheus bis-incisus on plate*).

Alpheus crassimanus, *Heller, Crustaceen der Novara-Reise*. S. 107, pl. x. fig. 2, var.

Alpheus Edwardsii, *Miers, Report on the Zoological Collections made in the Indo-Pacific Ocean, during the Voyage of H.M.S. 'Alert,' 1884*, p. 284 (*with all the synonyms there recorded*).

No fewer than thirty-five specimens of different size were collected, both males and females, namely, twenty specimens at Owen Island, ten in King Island Bay, four young individuals at Elphinstone Island, and one young specimen at Sullivan Island.

Mr. Miers deserves the thanks of carcinologists for having elucidated the synonymy of this almost cosmopolitan species, and I perfectly agree with him in the opinions he has expressed. I therefore not only regard *A. avarus*, *de Haan*, *A. strenuus*, *Dana*, and *A. leviusculus*, *Dana*, as identical with *Savigny's* species, discovered in the Red Sea, but also with *Heller's A. crassimanus*, described in the 'Novara Reise.'*

* Dr. Kossmann, when referring Red-Sea specimens to *A. crassimanus*, observes that the hands of his specimens did not perfectly agree with *Heller's* figure. This may be easily explained by the fact that in the figure of the 'Novara-Reise' the smaller hand has been figured, whereas Dr. Kossmann erroneously regarded it as the larger (*Kossmann, Zoolog. Ergebnisse einer Reise nach dem Rothen Meere*, p. 82).

Mr. Miers has not only given a new description of this species in his report, but he has also made many interesting remarks on its variations. I have therefore little to add to what has been said by him. In the typical specimens the second joint of the carpopodite of the second leg is precisely half as long as the first joint, or scarcely exceeds half the length of the latter, as is proved by the following measurements, which express in millimetres the length of these joints in eight specimens:—

Mergui Specimens.

Male specimens.			Female specimens.		
Whole length of the carpopodite.	First joint.	Second joint.	Whole length of the carpopodite.	First joint.	Second joint.
$7\frac{1}{2}$	$3\frac{1}{3}$	$1\frac{2}{3}$	8	$3\frac{2}{5}$	$1\frac{4}{5}$
6	$2\frac{1}{2}$	$1\frac{1}{4}$	$6\frac{1}{4}$	$2\frac{1}{2}$	$1\frac{2}{5}$
			$6\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{3}$
			$5\frac{1}{4}$	2	$1\frac{1}{4}$

Red-Sea specimens.

$6\frac{1}{2}$	$2\frac{1}{2}$	$1\frac{1}{2}$		$6\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{3}{4}$
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A variety sometimes occurs, in which the second joint is scarcely shorter than the first, as is proved by the following two female specimens, from the Mergui Archipelago:—

Whole length of the carpopodite.	First joint.	Second joint.
14	$4\frac{1}{2}$	$4\frac{1}{3}$
7	$2\frac{2}{5}$	$2\frac{1}{5}$

It was a specimen belonging to this variety which was figured in the 'Novara Reise.'

In most specimens the lobe or tooth, which occurs immediately behind the notch on the upper and under margins of the larger hand, is rounded or subacute, but rarely very acute, as is proved by a specimen from the Mergui Seas.

I can also record the existence of a variety of the smaller hand of the male, described by Miers, characterized by the upper margin of the palm being more or less distinctly notched, whereas it is smooth and entire in the type; the lower margin,

however, sometimes presents a trace of a slight notch. This variety, which occurs in two specimens in the collection, has been figured by Heller, *l. c.* pl. x. fig. 2.

In very large specimens the interocular portion of the rostrum appears more distinctly carinate than in younger individuals.

The largest individual of the collection is 58 millim. long from the tip of the rostrum to the end of the terminal segment, and its larger hand is precisely half as long, measuring 29 millim. In this specimen the carpopodite of the second leg measures 14 millim., whereas the two first joints have about the same length.

The other specimens are mostly of medium size, measuring 30–35 millim., but two of them are only 10 millim. long.

A. Edwardsii not only inhabits the whole Indo-Pacific, but also a part of the Atlantic region. It has been observed in the Red Sea, the whole Indian and Pacific Ocean to the west coast of America, and on the eastern coast of this continent from North Carolina to the Abrolhos (Brazil).

150. *ALPHEUS HIPPOTHOË**, n. sp. (Pl. XVII. figs. 1–5.)

Three adult specimens of this interesting form were collected, a male and an ova-bearing female at Sullivan Island, and another male in King Island Bay.

A. Hippothoë is most closely allied to *A. parvirostris*, Dana, and to *A. Edwardsii*, Aud., in its general appearance and in the structure of its anterior legs; but it may be readily distinguished from the former by the basal joint of the outer antennæ presenting no trace of an external spine, and from *A. Edwardsii* by the meropodites of the legs of the third and fourth pairs being armed with a short acute spine at the distal ends of their inferior margins.

The body closely resembles that of *A. Edwardsii*, Aud., the common Indian species. The rostrum is short, acute, and reaches a little beyond the middle of the first joint of the peduncle of the upper antennæ. As in *A. Edwardsii*, it arises from the front margin of the carapace; the interocular portion, however, is more distinctly carinate than in specimens of *A. Edwardsii* of the same size, being much compressed and separated by rather deep grooves from the orbits, which are unarmed. This inter-

* *Hippothoë*, one of the Nereids.

ocular portion of the rostrum is more or less prolonged backwards, the crest becoming gradually less visible in one specimen to the middle of the cephalothorax, but in the other two not so far. The upper surface of the cephalothorax is rounded and minutely punctate.

The postabdomen, and more especially its terminal segment, closely resembles that of *A. Edwardsii*, the terminal segment being armed on its upper surface with two pairs of minute spines; whereas in Audouin's species this upper surface is glabrous, it is more or less hairy in this species.

The two pairs of antennæ of *A. Hippothoë* are closely similar to those of *A. Edwardsii*, and differ from those of *A. parvirostris*, Dana, in the complete absence of an external spine on the basal joint of the outer antennæ. The second joint of the peduncle of the inner antennæ is about once and a half as long as the first, and the third is a little shorter than it; the peduncle is a little hairy. The peduncle of the outer antennæ is as long as, or scarcely longer than, that of the inner antennæ, and the basal scale, which is narrowed considerably towards the apex, and whose external more solid part terminates anteriorly in a spine, comparatively a little longer than in *A. Edwardsii*, is as long as the peduncle. The outer maxillipeds resemble those of *A. Edwardsii*, but they are a little longer, and project with a larger or smaller portion of the terminal joint beyond the antennal peduncles.

In their outer appearance, the legs present a striking resemblance to those of *A. parvirostris*, Dana, the legs of *A. Edwardsii* being more slender. The arms of the anterior legs are equal and unarmed at the distal ends of their upper margins; in *A. Edwardsii* the internal margin of the under surface is armed at the distal end with a small spine; but in this species a proper spine does not occur there, although the distal end terminates in a sharp point. The carpopodites are quite similar to those of *A. Edwardsii*. As regards its shape and structure, the larger hand of *A. Hippothoë* is intermediate between that of *A. Edwardsii* and that of *A. parvirostris*; for whereas the hand is less slender than in Audouin's species, the proportion of its length (the fingers included) to its breadth being exactly the same in this species and in *A. parvirostris*, the distal half of the hand in this species is more contracted and narrower than in *A. parvirostris*, resembling in this character *A. Edwardsii*. The hand is rounded at its proximal end, and notched on its upper as

on its lower margin. The upper margin of the palm, as in *A. Edwardsii*, terminates in an obtuse tooth immediately behind the notch, whereas such a tooth is not found behind the notch of the lower margin. The triangular depression on the inner, the quadrangular depression on the outer surface, and the impressed line on the proximal portion of the palm closely resemble those of *A. Edwardsii*. As I have already observed, the distal half of the hand, which lies beyond the notches of the upper and lower margins, is narrower in this species than in Dana's *A. parvirostris*, and resembles that of *A. Edwardsii*. The mobile finger is comparatively shorter than in *A. Edwardsii*, and is probably more like that of *A. parvirostris*, its upper carinate margin being still more rounded and circular. The inner surface of the hand is hairy, especially towards the fingers, which are also slightly hairy on their outer surfaces; the mobile finger is a little longer than the other, and, as in *A. Edwardsii*, is armed near the base on its inner margin with a strong rounded tooth fitting into a deep pit on the lower finger. I may add that the larger hand is comparatively thicker than that of *A. Edwardsii*.

The smaller hand is also comparatively less slender than that of *A. Edwardsii*; and, like the larger hand, it is also slightly thicker, and perfectly resembles the smaller hand of *A. parvirostris*. The rounded upper margin of the palm, which is marked at its proximal portion with a similar impressed line to that which also occurs on the larger hand, presents a slight trace of a notch immediately before the articulation of the mobile finger; but the lower margin is entire. The fingers are as long as, or slightly longer than, the palm, and perfectly meet together when closed, leaving no interspace between them; they have the same length, and their tips cross one another. The inner margins of the fingers are slightly excavated. The mobile finger of *A. Hippothoë* presents the same form in the male and in the female, whereas in *A. Edwardsii* the mobile finger of the smaller chela of the male has quite a different form from that of the female. In this species the mobile finger is slightly longitudinally carinate above, along its whole length, and both edges of its inner concave margin are continuous; the oblique rows of hairs with which the mobile finger of the smaller hand of the male of *A. Edwardsii* is covered above are wanting in *A. Hippothoë*. The inner edge of the internal concave margin of the immobile finger

is continuous from the base to the tip, but the outer edge is obliquely interrupted a little before the middle. The convex inner surface of the smaller hand is covered with many hairs, especially towards the fingers, which are very hairy on their inner surfaces.

The other legs closely resemble those of *A. parvirostris*. As regards the structure of the carpopodites of the second legs, this species resembles *A. Edwardsii*. The first joint is a little more than twice as long as the second, and a little shorter than the other four joints taken together; the third and fourth joints are very short and equal, each being half as long as the second joint; the fifth joint is longer than the preceding, but still a little shorter than the second joint; in the largest specimen these joints are respectively $3\frac{2}{5}$, $1\frac{1}{2}$, $\frac{3}{4}$, $\frac{3}{4}$, and $1\frac{1}{5}$ millim. long, in the youngest example $2\frac{2}{5}$, $1\frac{1}{5}$, $\frac{3}{5}$, $\frac{1}{2}$, and $\frac{3}{4}$ millim. In the largest specimen the hand is a little shorter than the last three joints of the wrist taken together, in younger specimens it is slightly longer; the fingers are constantly a little longer than the palm, whereas in *A. Edwardsii* they are as long as, or even slightly shorter than, the palm.

The form of the legs of the third and fourth pair is very characteristic of this species, and resembles that of *A. parvirostris*; they are, indeed, less slender than those of *A. Edwardsii*, and the meropodites are armed at the distal ends of their inferior margins with an acute spine which is not found in Audouin's species. These legs are a little hairy and the propodites are armed along their inferior margins with two or three rows of small spines. The legs of the fifth pair are also a little less slender than those of *A. Edwardsii*, which they otherwise resemble. The uropoda are almost exactly similar to those of Audouin's species, being armed at the base with two acute spines, and the outer rami present two or three spines at the external angle of their posterior margins. The largest specimen is 28 millim. long from the tip of the rostrum to the end of the terminal postabdominal segment. In the second specimen, likewise a male, the larger hand is $13\frac{1}{2}$ millim. long, and 6 millim. broad; whereas in a specimen of *A. Edwardsii* the larger hand, presenting a similar breadth of 6 millim., is $15\frac{3}{4}$ millim. long, appearing therefore comparatively more slender than that of *A. Hippothoë*.

151. *ALPHEUS MINOR*, Say.

Alpheus minus, Say, *Journ. Acad. Nat. Sci. Philad.* vol. i. p. 245 (1818); *Milne-Edwards, Hist. Nat. Crustacés*, t. ii. p. 356.

According to Mr. Miers, this species, discovered by Say on the eastern coasts of North America, occurs also in the Indo-Pacific region. He was able to compare typical specimens from East Florida with specimens from the Indian Seas, which belonged to *Alpheus neptunus*, Dana, and observed no other differences between them than "that the ocular spines and the rostrum are somewhat shorter and more triangulate in the Floridan examples than in the Oriental form" (*Zoology of H.M.S. 'Alert,' 1884*, p. 288); he therefore united *Alpheus neptunus* with the species described by Say, regarding it as a variety of the latter. I acquiesce in his opinion, and moreover also regard Stimpson's *A. biunguiculatus* from the Sandwich Islands as a variety of the very variable *Alpheus minor*.

Although I suspect that *A. tricuspidatus*, Heller, from the Red Sea, and *A. Charon*, Heller, from the Red Sea and the Nicobar Islands, may also prove to be only varieties of Say's species, I cannot at present decide this question, as there are no specimens at my disposal which present the characters of these two forms.

151a. *ALPHEUS MINOR*, var. *NEPTUNUS*, Dana.

Alpheus neptunus, Dana, *United States Expl. Exp., Crustacea*, i. p. 553, pl. xxxv. fig. 5.

Six specimens, viz. three males and three females of unequal size, were collected in King Island Bay, and doubtless belong to this species. All the female specimens are provided with eggs; the largest of them measures 21 millim. from the tip of the rostrum to the end of the terminal scale, whereas the smallest is only 15 millim. These individuals present the following characters:—

The ocular spines and the rostrum are of equal length and extend to the middle of the first (or antepenultimate) joint of the peduncle of the internal antennæ. The second joint of the latter is scarcely longer than the first, but is distinctly longer than the third joint. The distal half of the terminal joint of the outer foot-jaw projects beyond the peduncle of the external antennæ. The rounded upper margin of the palm of

the larger hand is armed at its distal end, above the articulation of the mobile finger, with a short acute spine. The first joint of the carpopodite of the second legs is even a little longer than the four other joints together, the second, third, and fourth joints are very short and of equal length, the fifth is nearly as long as the third and the fourth taken together; the hands are scarcely longer than the last two joints of the carpopodite taken together, the palm being a little shorter than the fingers and a little shorter also than the terminal joint of the wrist. The inferior margins of the meropodites of the legs of the third pair are armed with four or five spinules along their distal halves; the meropodites also of the legs of the fourth pair present one to three similar spinules in the middle of their inferior margins, but the meropodites of the last pair of legs are unarmed. The dactylopodites of the legs of the last three pairs are biunguiculate, the acute claw being armed on its upper or external margin with a second, much smaller claw.

Alpheus minor, var. *neptunus*, has been hitherto collected in Japanese and Chinese Seas (Island of Ousima, Hongkong), in the Sooloo Sea (Dana), at Port Jackson (Eastern Australia), in the Red Sea (Suez), and at Ceylon, so that this variety appears to be distributed throughout the Oriental Seas.

151 b. *ALPHEUS MINOR*, var. *BIUNGUICULATA*, Stimps.

Alpheus biunguiculatus, Stimpson, *Proc. Acad. Nat. Sci. Philad.* 1860, p. 31.

Three other specimens collected at Sullivan Island are doubtless examples of *Alpheus biunguiculatus*, Stimps., viz.: an adult ovabearing female and two small males. The female specimen is 21 millim. long. In these specimens the claws of the last three pairs of legs are biunguiculate, as in *A. neptunus*, but differ from it in the smaller claw being placed on the under or internal side of the larger, and by the inferior margins of the meropodites of the legs of the third and fourth pairs being unarmed. The other characters of *A. biunguiculatus* mentioned by Stimpson are wholly absent in these specimens or only partially present. Thus the upper margin of the palm of the larger hand in two specimens (the adult female and one male) is unarmed, but in the third specimen (the small male) it is armed at its distal end with a spine similar to that found in *A. neptunus*. The joints of

the carpopodite of the second legs have precisely the same length as in *A. neptunus*. The joints of the peduncle of the internal antennæ perfectly agree with Dana's figure of *A. neptunus* (pl. xxxv. fig. 5a), the second joint being distinctly shorter than the first, whereas in the six specimens referred above to *A. neptunus* the difference is much smaller. In one of our examples the ocular spines and the rostrum have the same length, extending, as in *A. neptunus*, to the middle of the first joint of the peduncle of the internal antennæ; but in the two other specimens the rostrum projects a little more forwards than the ocular spines, but it does not reach the distal end of the first joint.

I regard this form also as a variety of *Alpheus minor*, Say, because the foregoing species vary in some of their characters, as I have demonstrated above; and it is also possible that the two characters above mentioned may prove to be variable, when a sufficiently large series is examined. *Alpheus tricuspidatus*, Heller, from the Red Sea is probably identical with *A. biunguiculatus*.

Alpheus biunguiculatus was discovered by Stimpson at the Sandwich Islands amongst Madrepores.

Genus NICA, Risso.

152. NICA MACROGNATHA, Stimps.

Nica macrognatha, Stimpson, *Proc. Acad. Nat. Sci. Philad.* 1860, p. 26.

Two very young specimens were collected at Owen Island. Although they are in a very bad and mutilated condition, there can be little doubt that they belong to Stimpson's species, which was discovered at Hongkong. The rostrum, which is a little shorter than the eyes, is rather lamellate and appears acute when seen from above. The external maxillipeds are wanting in both specimens. The armature of the longitudinally sulcated terminal somite of the abdomen wholly agrees with the description quoted above. The didactyle anterior leg is a little shorter than the monodactyle, and its carpopodite is about as long as the palm (not shorter than it), whereas the fingers are shorter than the palm.

Genus HARPILIUS, Dana.

153. HARPILIUS MIERSI, n. sp. (Pl. XVII. figs. 6-10.)

Two adult specimens, a male and an ova-bearing female, were found at Elphinstone Island.

This most interesting species, which I dedicate to the author of the important Report on the carcinological Collections made in the Indian Ocean during the voyage of H.M.S. 'Alert,' presents a remarkable transition between the genera *Coralliocaris* (*Ædipus*, Dana) and *Harpilius*, the small curved claws of the legs of the last three pairs being armed with a small accessory tooth on their inner (inferior) margins, quite as in the genus *Coralliocaris*. But *Harpilius Miersi* is also remarkable, because in general appearance and in many particulars it presents a striking resemblance to two allied species, viz. *Anchistia aurantiaca*, Dana, from the Fiji Islands, and *Harpilius inermis*, Miers, from the Australian Seas, especially to the former.

The body of *Harpilius Miersi* is somewhat compressed, especially the postabdomen, which is curved downwards, like that of *Harpilius inermis*; the surface of the body appears smooth to the naked eye, but is really minutely punctate when examined under a magnifying-glass. The anterior margin of the carapace is armed with a small antennal spine above the basal joint of the external antennæ. The upper surface of the carapace is rounded. The rostrum is very characteristic: it is strongly compressed, ensiform, longer than the eyes, and reaches to the middle of the penultimate joint of the internal antennæ; in a dorsal view it appears acute at its apex, and much resembles that of *Anchistia aurantiaca*. In a lateral view it appears lamellate, being nearly four times as long as broad; in that position also the denticulation of the rostrum becomes visible by means of a magnifying-glass. The upper margin is almost entire throughout its length, except quite at the distal end (fig. 8), where it is armed with four small acute teeth, placed immediately before the acute tip; the under margin also is almost entire, presenting only one small tooth at the distal end, placed immediately below the second or third tooth of the upper margin; the tooth of the under margin, however, is much smaller than the teeth of the upper margin, and can only be distinguished by means of the microscope. The terminal segment of the postabdomen is rounded above, but gradually and considerably narrows towards its distal end, which bears some setæ; its lateral margins are unarmed. The peduncles of the upper antennæ are longer than the rostrum, which reaches to the middle of their penultimate joint, but are a little shorter than the scale of the external antennæ; the last two joints have almost the same length. The external

antennæ are somewhat longer than the body, and the joints of the flagella are naked. Their peduncles are much shorter than those of the antennules, being quite as long as the rostrum; the basal scales are much longer than the peduncles, and even project a little beyond the peduncles of the inner antennæ. The external maxillipeds (fig. 7) are a little shorter than the peduncles of the outer antennæ; they much resemble those of *Palæmonella orientalis* (Dana, l. c. pl. xxxviii. fig. 4 d), as regards the relative length and breadth of the joints. The terminal joint is a little shorter than the penultimate, and the last two joints together are a little longer than the antepenultimate joint, which is but little broader than the penultimate, being much less dilated than in the typical species of the genus, *Harpilius lutescens*, Dana.

The anterior legs are slender, and, with the distal halves of their carpopodites, project beyond the antennal scales; the carpopodite, which is gradually somewhat thickened towards its distal end, is a little shorter than the arm, and but little longer than the hand; whereas in *Harpilius inermis*, Miers, it is about twice as long as the hand. The palm is a little shorter than the hairy fingers.

The somewhat unequal chelipedes of the second pair are closely similar to those of *Anchistia aurantiaca*, Dana, and are much longer and larger than the anterior legs, being almost twice as long as the carapace. The meropodites are a little longer than the ischiopodites, and nearly twice as long as the carpopodites, which are very short, still shorter than those of *Anch. aurantiaca*. The hands (fig. 9) much resemble those of the latter species. The palm is rounded above and below, and is much swollen at its base and thicker than the carpopodite, the difference between both joints being greater than in *Anchistia aurantiaca*; the palm towards its distal end being slightly compressed. The fingers are strongly compressed and are a little longer than half the length of the palm, but shorter than half the length of the whole hand. Their tips are pointed, somewhat curved and hairy, and have thin inner edges. The mobile finger is scarcely longer than the other, and is armed at the base of its inner edge with two or three teeth; the index, on the contrary, presents eight or nine teeth of equal size at the base of its inner edge, much smaller, however, than the teeth of the mobile finger. The remaining part of the inner edges is sharp and unarmed. The fingers of both hands are armed with such teeth, whereas in *Harpilius inermis*

the teeth of the fingers of the left chelipede are not developed. The chelipedes of the second pair are everywhere smooth and unarmed. The three other legs are slender, unarmed, and closely resemble those of *Harpilius inermis*, but the carpopodites are a little shorter in proportion to the length of the propodites, and the small curved claws (fig. 10) are armed with a small acute tooth at their inner margins, as in the genus *Coralliocaris*, Stimps. (= *Ædipus*, Dana).

The uropoda perfectly agree with those of *Harpilius inermis*, Miers, reaching a little beyond the distal end of the terminal postabdominal segment, and being armed with a curved spine above at their bases. The rami are ovate, ciliated, and the outer are a little broader than the inner.

The larger of our two specimens, the ova-bearing female, is 26 millim. long from the tip of the rostrum to the end of the terminal postabdominal segment, the carapace (with the rostrum) measuring 9 millim. The larger chelipede of the second pair is 17 millim. long, the hand measuring $9\frac{3}{4}$ millim., the palm 6 millim., the fingers $3\frac{3}{4}$ millim.

Genus HIPPOLYTE.

154. HIPPOLYTE OLIGODON, n. sp. (Plate XVIII. figs. 1-6.)

The collection contains one male specimen of a species of *Hippolyte* which appears to be new; this I now propose to describe under the name of *oligodon*, on account of the small number of teeth with which the rostrum is armed. This specimen was found at Elphinstone Island; but, unfortunately, it is somewhat mutilated, having lost a part of the flagella of the two pairs of antennæ, and also some legs.

The rather slender animal is about 28 millim. long, from the tip of the rostrum to the end of the terminal postabdominal segment, the postabdomen measuring 19 millim. This species seems to be most allied to *Hippolyte spinifrons*, M.-Edw., from New Zealand; but may be distinguished from it at once by the ordinary size of the antennal spine on the anterior margin of the carapace, which is small and does not even reach to the middle of the eyepeduncles. In *Hippolyte oligodon*, as in *Hippolyte spinifrons*, the postabdomen is straight and not deflexed in the middle, whilst in most other species of this genus it is suddenly geniculated downwards. The rostrum is spiniform, small, and

very acute, and is scarcely longer than the short eye-peduncles, and does not reach to the distal end of the first (antepenultimate) joint of the peduncle of the internal antennæ. It arises from the anterior third of the cephalothorax, with a small carina, which, however, does not extend to the middle of the cephalothorax; the rostrum is quite unarmed below, but armed on its upper margin with three acute teeth, directed forwards. The first tooth is placed on the carapace, at a distance of about a fifth of its length from the anterior margin; the second or middle tooth is found on the rostrum itself, immediately before the anterior margin of the carapace, and the third tooth quite on the middle of the rostrum, its distance from the acute tip being a little longer than its distance from the second tooth (fig. 2). The distance of the first tooth from the second finally is a little longer than the distance of the third to the tip. The anterior margin of the cephalothorax is armed with a small, acute, antennal spine, the point of which is situated quite below the middle of the distance between the tips of the two anterior teeth of the rostrum.

The terminal postabdominal segment tapers gradually and considerably to its distal end, which is truncated, straight, and armed with four spines; the two median spines are a little longer than the posterior margin of the segment and more than twice as long as the lateral spines; the upper surface of the segment is armed with two pairs of small spines, and the distal halves of the lateral margins are ciliated, some ciliæ being also found between the four spines of the posterior margin.

The peduncles of the internal antennæ are as long as, or scarcely longer than, the basal scales of the external antennæ; the first joint is somewhat longer than the rostrum, the second is a little shorter than the first, and the third or anterior joint is scarcely half as long as the second. The first joint is armed at the distal end of its upper margin with two very small spinules, and the second joint with one spinule at its distal end: the flagella are broken in part, so that I cannot describe their length; I may remark, however, that they are thin, the one scarcely thicker than the other, and that each of their joints is provided with one or two very short hairs, which can only be observed by means of a microscope (fig. 3).

The peduncles of the external antennæ are almost as long as those of the internal; their flagella are broken and lost. The basal scales are nearly as long as the peduncles, being but

little shorter; they are ovate, ciliated along their internal margins and at their rounded anterior ends, and their external margins terminate anteriorly in a small spinule.

As in *H. spinifrons*, the outer maxillipeds are very elongate and project much beyond the antennal scales, the penultimate joint of which is a little shorter than the terminal joint, extending a little beyond it. The penultimate joint is armed with a small spinule at its distal end; along the upper margin of the terminal joint (fig. 4) four or five similar spinules are observed, and four or five spinules occur also at the terminal, obliquely truncated end of the joint. The last two joints are ciliated, the ciliæ being partly arranged in transverse rows. The equal, rather slender, anterior legs do not extend so much forward as the outer maxillipeds, being shorter than them and quite unarmed, although a little hairy. The meropodites are slender and project as much forwards as the eyes; the carpopodites are a little longer than half the length of the meropodites, and gradually appear a little thicker towards their distal ends. The hands (the palm and the fingers taken together) are a little longer than the carpopodites; the fingers are shorter than the palm, measuring two thirds of it, and are provided with some small tufts of short hairs.

The second legs are filiform and longer than the outer maxillipeds. The ischiopodites of these legs extend forwards nearly to the anterior margin of the carapace; the meropodites are a little longer than the ischiopodites, and reach almost to the distal end of the antennal scales or the middle of the penultimate joint of the external maxillipeds. The carpopodites, which are $8\frac{1}{2}$ millim. long, are twice as long as the meropodites, and almost as long as the carapace (the rostrum included); they are divided into 24 or 25 joints; the terminal joint (fig. 5) is twice as long as the other joints, and presents a small tuft of hairs close to its articulation with the hand. The other joints of the carpopodite are naked. The hands (the palm + the fingers) are as long as the three terminal joints of the carpopodite taken together; the palm is nearly as long as the terminal joint of the wrist; and the somewhat hairy fingers are a little shorter than the palm.

The other legs are partly broken, so that I can only add the following. The meropodites of the legs of the third pair extend as much forward as those of the legs of the first pair, and are armed with a small spinule near their distal ends. The pro-

podites are also armed with a similar spinule, about in their middle. The legs of the fourth pair reach to the distal end of the antennal scales; their meropodites also are armed with a small spine near their distal ends; the propodites are about once and a half as long as the carpopodites, and armed with a row of four spinules along their inner margins. The dactylopodites finally (fig. 6) have the ordinary form, being nearly straight, scarcely arcuate, pointed and acute, and each is armed at its base on its inner margin with a small spinule. The legs are very sparsely covered with a few hairs.

The uropoda are a little longer than the terminal segment of the postabdomen, and their inner ovate rami are ciliate.

Genus PALÆMON, *Fabr.*

155. PALÆMON CARCINUS, *Fabr.*

Palæmon carcinus, *Fabricius*, *Suppl. Entom.* p. 402; *Milne-Edwards*, *Hist. Nat. Crust.* t. ii. p. 395; *de Man*, "On some Species of the Genus *Palæmon*, *Fabr.*," in *Notes from the Leyden Museum*, i. p. 165.

One very young specimen only was collected at Mergui. It is still smaller than the specimen which I described in the "Notes from the Leyden Museum," for it is only 45 millim. long from the tip of beak to the end of the terminal segment. This specimen, however, wholly agrees with that in Leyden, the carpopodite of the second pair of legs being twice as long as the palm, and the first pair of legs projecting a little beyond the appendages of the antennæ.

Palæmon carcinus has been recorded from the mouth of the Ganges, from Singapore, Sumatra, Borneo, the Philippines, Java, Celebes, and Siam.

156. PALÆMON ACUTIROSTRIS, *Dana*. (Plate XVIII. fig. 7.)

Palæmon acutirostris, *Dana*, *Unit. States Expl. Exp. Crustacea*, i. p. 590, pl. xxxix. fig. 1.

The collection contains seven specimens of this species, which was discovered at the Sandwich Islands. Six were captured at King Island, in fresh water, the seventh at Elphinstone Island. The few points in which these specimens differ from Dana's description in his 'Conspectus' and from his figures (the text is not at hand) are so unimportant that I do not regard them as examples of any other species but *P. acutirostris*. If, however, further research should prove that the species

from the Sandwich Islands is a distinct species, then the Mergui specimens should certainly be referred to Stimpson's *P. boninensis*.

The largest specimen, a male, is 85 millim. long from the tip of the rostrum to the end of the terminal postabdominal segment. In this specimen the carapace is a little rough anteriorly, being covered with minute spinules, arranged irregularly and only visible with a magnifying-glass; on the posterior half of the cephalothorax these spinules are not found, the upper surface being only minutely punctate. In the other younger specimens these minute spinules are much less numerous, being still only observed on the antero-lateral parts of the carapace, or they are even quite absent, the cephalothorax then being smooth.

The rostrum is characteristic. It is quite similar to that of *P. superbus*, Heller (Novara-Reise, Taf. x. fig. 10), but in this species it is generally shorter than the antennal scales and not longer. In most specimens, as, indeed, in the largest, the rostrum does not reach to the end of the antennal scales, being a little shorter than these appendages, but it exceeds the peduncles of the internal antennæ: in the smallest individual, which is only 40 millim. long, the rostrum is even a little longer than the antennal scales; whereas in the specimen from Elphinstone Island it is only just as long as the peduncles of the internal antennæ. In most specimens it is a little convex above the eyes and slightly directed downwards at the distal end, sometimes, however, it is a little curved upwards towards the latter. The rostrum is $\frac{12-13}{3-4}$ toothed; in the largest specimen the formula is $\frac{13}{4}$, in four other specimens $\frac{12}{4}$, and in the specimen from Elphinstone Island the rostrum is $\frac{12}{3}$ dentate. In the specimens which were collected by Dana at the Sandwich Islands the formula was $\frac{14-16}{4-5}$, but this difference may be regarded at most as indicating a local variety. The teeth of the upper margin are small and nearly equidistant; the first four teeth are placed on the carapace behind its anterior margin, the first tooth is found at a distance of a third of the length of the cephalothorax from its anterior margin and the teeth occur quite to the tip of the rostrum. (In Dana's figure 1 *a'* six teeth are shown as occurring behind the anterior margin of the carapace; but this figure is certainly incorrect, twenty teeth having been figured on the upper margin.)

The external maxillipeds are of moderate length, being only

a little longer than the peduncles of the external antennæ, projecting with their terminal joint beyond them. In the largest specimen the anterior legs project much beyond the antennal scales, exceeding them by the anterior fourth part of their carpopodites; in the youngest individuals, however, they are still longer than the antennal scales, but only project by the greater half of the hand beyond them. The carpopodites are nearly twice as long as the hands (the palm and the fingers taken together). In the largest specimen the legs of the second pair, which are much stronger than those of the first pair, are a little unequal, the right being the larger. The larger leg, measuring about 75 millim., is still a little shorter than the body; the arm does not reach to the anterior end of the antennal scales, but to about the middle of the carpopodite of the anterior legs, and the latter project as much forwards as the carpopodite of the larger leg. The carpopodite, measuring 13 millim., is a little shorter than the arm and a little shorter than half the length of the hand (the palm and the fingers taken together); it measures about two thirds of the length of the palm. Like the arm and the wrist, the palm also is nearly cylindrical, and longer than the fingers, the latter being as long as the wrist and measuring two thirds of the length of the palm.

The slender fingers (13 millim. long) are quite close together, except at their basal thirds, where they are a little gaping; and here they are each armed with two or three small teeth, but they are provided with a thin acute edge along the two distal thirds of their inner margins. The other leg resembles the larger one, differing only by its smaller size. Both legs are very scabrous and rough, being covered with numerous small acute spinules, which are much larger along the under surface of the joints than on their upperside. The joints also are covered, though very sparsely, with minute hairs.

In the smaller specimens, as in one that measures about 55 millim., the legs of the second pair are also already unequal, the right being the larger. The arm of the larger leg, however, now only projects its smaller anterior half beyond the peduncle of the outer antennæ and the carpopodite half its length beyond the antennal scales. In these specimens the joints of the legs of the second pair present almost the same propor-

tions as in the largest specimen, and the fingers are of a fine blue colour with white tips.

As regards the other legs, I may add that those of the third pair are quite as long as the antennal scales, and that those of the fifth pair do not project so much forwards, reaching only to the distal end of the peduncles of the internal antennæ. These legs are also minutely scabrous. The propodites of the legs of the fifth pair are still a little longer than the meropodites and about twice as long as the carpopodites.

The species with which our *P. acutirostris* is most closely allied are the following:—

(1) *Palæmon asperulus*, v. Mart., from Shanghai, seemingly differs from *P. acutirostris* in its rostrum, having only two or at most three teeth of the upper margin situated behind the anterior margin of the carapace; by the carpopodite of the anterior legs being comparatively shorter, and by the carpopodites of the legs of the second pair being not shorter than the arm.

(2) *P. boninensis*, Stimps., from the Bonin Islands. This form is scarcely different from *P. acutirostris*, and may perhaps prove to be merely a local variety.

(3) *P. japonicus*, de Haan, which differs from it by the shorter fingers of the larger hand of the second pair, which are precisely half as long as the palm, and by some other characters.

(4) *P. brevicarpus*, de Haan, also from Japan. In this form the fingers of the larger hand of the second pair are quite as long as the palm.

P. acutirostris, Dana, has hitherto, so far as I know, been only recorded from the Sandwich Islands.

157. PALÆMON EQUIDENS, Dana.

Palæmon equidens, Dana, *United States Expl. Exped.*, Crustacea, i. p. 591, tab. xxxix. fig. 2.

Four specimens collected in fresh water I refer to *P. equidens*, Dana. Unfortunately all these specimens have lost their second pair of legs, except one male, in which one of the legs, probably the smaller one, has been preserved; I can therefore add little to Dana's description.

The formulæ for the teeth of the rostrum of these four specimens are: $\frac{9}{4}$, $\frac{9}{5}$, $\frac{10}{4}$, and $\frac{10}{7}$; so that the formula is $\frac{9-10}{4-7}$. The first two teeth are placed on the carapace behind the anterior

margin, the third tooth exactly above it; the rostrum is more or less curved upwards towards the apex. The specimen, in which one of the second legs has still been preserved, is 72 millim. long from the tip of the rostrum to the end of the terminal scale. The leg of the second pair is 51 millim. long; the arm ($8\frac{1}{2}$ millim. long) projects almost as much forward as the external maxillipeds, thus a little more than the peduncle of the external antennæ; the carpopodite (13 millim. long) is about once and a half as long as the arm, and somewhat thickened towards its distal end; the hand ($18\frac{1}{2}$ millim. long) is almost once and a half as long as the carpopodite, the palm (11 millim.) is a little shorter than the carpopodite, and the fingers measure nearly two thirds of the length of the palm. They meet together along their whole length; and both fingers are provided on their inner margins with a thin acute edge; the mobile finger presents, moreover, two minute teeth at its base, and the other finger one, opposite those of the mobile finger. The whole leg is minutely scabrous and rough, being covered by small spinules.

The legs of the first pair project with their hands beyond the antennal scales, the hands being half as long as the wrists. The legs of the third pair project as much forward as the rostrum; and the other legs are scarcely shorter.

The other specimens are about the same size; but this species, according to Dana, attains a length of 120 millim.

P. equidens has hitherto been only recorded from Singapore, and is still a very insufficiently known form. The species from Mauritius, which Heller referred to *P. equidens* (Heller, Sitzungsber. kais. Akad. der Wiss. in Wien, Bd. xlv. p. 418, Taf. ii. fig. 44) is certainly a different species, distinguished by the carpopodite of the larger hand being shorter than the palm. *P. Idæ*, Heller, may perhaps prove to be identical with Dana's *P. equidens*.

Family PENÆIDÆ.

Genus PENÆUS, *Fabr.*

158. PENÆUS SEMISULCATUS, *de Haan.*

Penæus semisulcatus, *de Haan, Fauna Japon., Crustacea*, p. 191, tab. xlv. fig. 1; *Miers, "On the Penæidæ," Proc. Zool. Soc. London*, 1878, p. 299.

Two adult specimens were collected in the Mergui Archipelago. They measure about 24 centim. from the tip of the rostrum to the end of the terminal segment of the postabdomen. Mr. Spence Bate, in his critical examination of the Penæidæ (Ann. & Mag. Nat. Hist., 1881, vol. viii. p. 178), comes to the conclusion that this species and *P. indicus*, M.-Edw., are mere varieties of *P. monodon*, Fabr. This may be so; but it appears to me even more probable that *P. semisulcatus*, de Haan, is identical with *P. monodon*, Fabricius, because the diagnosis of the latter agrees perfectly with that of the former; but *P. semisulcatus* is probably distinct from *P. indicus*, the typical specimen of which has been figured by Spence Bate, though both species are apparently closely allied. *P. indicus* probably differs from the species of the 'Fauna Japonica' by the following characters:—Although the rostrum presents the same form in both species, being slightly elevated at the extremity, it is constantly armed in *P. semisulcatus* with three teeth at its lower margin, but in *P. indicus* with four or five; and the posterior tooth is placed a little more backwards in regard to the hepatic spine in the former than in the latter. In the second place, I may observe that the lateral sides of the cephalothorax of *P. semisulcatus* present a horizontal crest, close to and immediately below the deep hepatic sulcus (described for the first time by Hilgendorf), proceeding towards the antennal scales, which does not seem to occur in *P. indicus*, according to the figure of this species given by Spence Bate. I may also add that in *P. semisulcatus* the antennal sulcus* is very deep in its posterior portion, as is also the hepatic sulcus, but the gastrohepatic sulcus is faintly defined, as has been already pointed out by Miers. The third postabdominal segment is not keeled in either of these specimens, and the median dorsal keel of the fourth segment does not even extend to its anterior margin; I therefore presume that Mr. Miers is wrong in describing the third to the sixth segment as keeled.

The rostrum in both specimens is $\frac{8}{3}$ - and $\frac{7}{3}$ -dentate. I may add that the flagella of the internal antennæ have both nearly the same length, being a little longer than the peduncle, *i. e.* the distance from the distal end of the terminal joint of the peduncle to the anterior margin of the carapace. The upper or external flagellum is a little broad and grooved along the proximal third of its

* I here follow the terminology of Stimpson.

length; whereas the remaining part, like the other flagellum, is cylindrical. This structure, as we know, is more completely developed in the genus *Solenocera*, in which the whole upper flagellum is broader than the other, and hollow on its inner side.

Penæus semisulcatus, de Haan, has been recorded from the Red Sea (Djeddah, *de Man*), Mozambique (*Hilgendorf*), Pondicherry, Calcutta, the Chinese and Japanese Seas, the Philippines, the Fiji Islands, and from North Australia. It appears, therefore, to be an inhabitant of the whole Indo-Pacific region.

159. *PENÆUS SCULPTILIS*, *Heller*.

Penæus sculptilis, *Heller*, *Crustaceen der Novara-Reise*, p. 122, Taf. xi. fig. 1.

Two fine adult female specimens were collected in the Mergui Archipelago. The larger specimen measures 140 millim. from the tip of the rostrum to the end of the terminal segment of the postabdomen, and therefore appears still larger than the specimens of the 'Novara' Expedition. These individuals agree perfectly with Heller's description and figure, except in the length of the flagella of the upper antennæ. In them the flagella of the internal antennæ are a little shorter than their peduncle; but Heller figured them as longer than it. Perhaps this difference of length may be a sexual character, and I therefore call attention to it.

The surface of the cephalothorax appears minutely punctate when seen under a magnifying-glass. The upper margin of the rostrum, which extends as much forward as the antennal scales and is slightly convex above the eyes, and somewhat curved upward at its styliform acute extremity, is armed with eight teeth in the specimens, and in the 'Novara' specimens with nine; but this difference is certainly individual. The posterior tooth is placed immediately before the hepatic spine, when both are compared with one another, and is separated by more than twice the ordinary distance from the preceding. The dorsal median crest, which extends from the base of the rostrum to the posterior margin, is distinctly canaliculated.

The dorsal median carinæ of the first and second segments are rather obtuse; each consists of two small, parallel, longitudinal ridges, situated close to one another; the carinæ of the other segments gradually appear more acute. The telson is

deeply longitudinally grooved, but is not armed with spinules on its lateral margins.

The first and second pairs of legs are unispinose at the bases, and there are no spines on the third pair. In the larger specimen, which is apparently an adult, the legs of the third pair extend to the distal end of the penultimate joint of the internal antennæ, being longer than the peduncle of the external antennæ.

This species is apparently closely allied to the Indian *P. monoceros*, Fabr., but especially to the Japanese *P. curvirostris*, Stimps. *P. Hardwickii*, Miers, is probably a mere variety of *P. sculptilis*; for it differs from it only by its rostrum being a little more elevated at its extremity, and by the first two post-abdominal segments being not at all carinate.

P. sculptilis has been found also on the shores of Java.

160. *PENÆUS MERGUIENSIS*, n. sp. (Pl. XVIII. fig. 8, and Pl. XIX. fig. 1.)

As I have already observed (p. 285), I suspect *P. monodon*, Fabr., will prove to be identical with *P. semisulcatus*; for de Haan's description agrees perfectly in all its characters with those of the 'Fauna Japonica,' and because *P. semisulcatus* is now known to occur also in the Indian Ocean.

The species which I now intend to describe is certainly different from *P. semisulcatus*, and the distinctive characters between both forms will be enumerated below. This new species, however, is also closely allied to *P. esculentus*, Hasw., from Sydney, and to *P. indicus*, M.-Edw. (= *P. carinatus*, Dana?), but nevertheless it appears to me to be different. The most striking characters of *P. merguiensis* are furnished by the rostrum and by the antennæ, especially the internal.

Seven fine specimens (5 ♂, 2 ♀) were collected in the Mergui Archipelago. The largest specimen and the smallest are females, whereas the five males are of an intermediate and nearly equal size.

The rostrum in most specimens extends quite as far forwards as the antennal scales, projecting a little beyond the peduncles of the internal antennæ; in the largest specimen, however, it is much shorter, reaching only to the distal end of the penultimate joint of the peduncles of the upper antennæ; in the smallest specimen, on the contrary, (a female), it projects even a little beyond the antennal scales. These are, however, only individual

differences. The rostrum is styliform in its distal half, very acute, and projects straightly forwards, being never curved upward towards its extremity; it is continued backwards into a short ridge which does not attain the posterior margin of the carapace, and which in most specimens is slightly flattened or even slightly sulcate for a part. The rostrum is $\frac{7-8}{4-5}$ dentate, the formula being in three specimens $\frac{8}{4}$, in two $\frac{8}{5}$, and in the two remaining $\frac{7}{4}$; the first tooth, *i. e.* its point, is placed a little before the middle of the cephalothorax, and constantly a little behind the hepatic spine, whereas in *P. indicus* this spine is found precisely below, and not before, the point of the first tooth of the rostrum. The distance of the first tooth from the second is a little longer than the distance between the second and the third; the intervals between the other teeth of the upper margin slightly increase distally, the most anterior tooth being separated from the apex of the rostrum by an interval which is as long as, or even a little shorter than, that which separates it from the preceding. The teeth of the lower border are smaller than those of the upper; their intervals also increase slightly in length, and the foremost stands closer to the apex of the rostrum than the foremost tooth of the upper border. Whereas the distal half of the rostrum is styliform, the proximal half which is found on the carapace is more or less elevated into a high crest, characteristic of our species.

The antennal and the hepatic spines are both very small, much smaller than those of *P. semisulcatus*; other spines are not found on the carapace. The antennal and the hepatic sulci are very deep in *P. semisulcatus*, whereas in this species they are faintly defined, especially the latter. The gastro-hepatic sulcus is also faintly defined, just as in *P. semisulcatus*.

The first, second, and third segments of the postabdomen are rounded on their dorsal surfaces; the fourth is keeled, but the keel occurs only on the posterior two thirds of the dorsal line; the fifth and the sixth segments are also carinate, the acute keel of the sixth terminating posteriorly in a short acute tooth. The terminal segment is unarmed and provided with a rather deep longitudinal groove on the middle of its dorsal surface. The first, second, fourth, and fifth segments are marked with a small notch on each side posteriorly. The "ventral plate" of the female much resembles that of *P. indicus*, M.-Edw. (Spence Bate, *l. c.* pl. xii. fig. 5), but is somewhat less distinctly circular;

the internal longitudinal margins are curved upward, as in *P. indicus*.

The internal antennæ are closely similar to those of *P. semisulcatus*; but the internal flagellum is a little shorter than the external. The peduncle is constantly a little shorter than the antennal scales. The external flagellum is much longer than the peduncle, *i. e.* the distance between the distal end of the terminal joint and the frontal margin of the carapace, and when laid backwards it reaches to nearly the first tooth of the rostrum; as in *P. semisulcatus*, this flagellum is broad and hollowed along the proximal third of its length. The inner or under flagellum is cylindrical and shorter than the other, and does not reach to the anterior margin of the carapace when laid backwards. The length of the flagella of the internal antennæ distinguishes this species at first sight from the Australian *P. esculentus*, Hasw. The flagella of the outer antennæ are almost twice as long as the whole animal.

The external maxillipeds are longer in the male than in the female; in the male they are as long as the peduncle of the internal antennæ, and reach almost to the distal end of the antennal scales; whereas in the female they are much shorter, and scarcely extend beyond the distal end of the antepenultimate joint of the peduncle.

The legs of the first pair are a little longer than the peduncle of the external antennæ, but do not project beyond the eyes; their carpopodites are nearly once and a half as long as the hands (the palm and the fingers taken together). They are armed with a spine on the under surface of their second joints, and with another spine on the under surface of their third joints, just as in *P. semisulcatus*, de Haan, and in *P. esculentus*, Hasw.

The legs of the second pair scarcely reach to the distal end of the penultimate joint of the peduncles of the internal antennæ; their carpopodites are hardly more than twice as long as the hands, and they are armed with a spine on the under surfaces of their second joints. The legs of the third pair are the longest of all; in the largest specimen they scarcely extend beyond the antennal scales, but in the male specimens the fingers almost reach beyond them. Their carpopodites, in the largest specimen, are precisely twice and a half as long as the hands, but in the younger specimens they are a little more. The legs of the fourth pair are a little longer than the peduncle of the external antennæ;

their carpopodites are scarcely twice as long as the depressed lanceolate dactylopodites. The last legs are nearly as long as and similar to those of the fourth pair.

The rami of the uropoda are much longer than the terminal segment of the postabdomen, and are quite similar to those of *P. semisulcatus*.

The largest specimen is about 20 centim. long from tip of rostrum to the end of the terminal segment of the postabdomen.

P. merguiensis differs from *P. semisulcatus*, de Haan, (1) by the form and structure of the rostrum; (2) by the postrostral ridge not proceeding backwards to the posterior margin of the carapace, and being much less distinctly sulcate; (3) by the faintly defined antennal and hepatic sulcus; (4) by the absence of the horizontal crest on the antero-lateral surface of the cephalothorax, which in *P. semisulcatus* is found below and parallel to the hepatic crest, being directed towards the peduncle of the outer antennæ; (5) by the inner flagellum of the upper antennæ being shorter than the external one. *P. merguiensis* also differs from the Australian *P. esculentus*, Hasw., by its straight rostrum, which is armed with more teeth, by the faintly defined gastro-hepatic sulcus, and at first sight by the much longer internal antennæ. It also differs from the still imperfectly known *P. indicus*, with which *P. carinatus*, Dana, is probably identical, by the shape of its rostrum; by the somewhat shorter flagella of the internal antennæ, of which the external one seems not to be dilated at base; by the much shorter flagella of the external antennæ; by the form of the ventral plate; and probably by some other characters.

161. *PENÆUS LYSIANASSA**, n. sp. (Pl. XIX. fig. 1.)

Fourteen specimens (6 ♂, 8 ♀) of this interesting new species were collected in the Mergui Archipelago.

Penæus Lysianassa belongs to that group of species in which the rostrum is shorter than the eyes; and it is apparently closely allied to *P. Richtersii*, Miers, from the seas of Madagascar.

The cephalothorax is scarcely more than twice as long as broad, and is scantily clothed with a short pubescence; some parts of the surface that are slightly elevated are quite glabrous,

* *Lysianassa*, one of the Sea-nymphs.

as, *e. g.*, the dorsal median ridge, a lateral longitudinal ridge proceeding from the hepatic spine to the posterior margin, the posterior margin itself, &c., so that the pubescence appears only on those parts of the outer surface which are slightly impressed.

The rostrum is very short, and reaches only halfway to the end of the eye-peduncles; it is strongly laterally compressed, tolerably high, and the lateral surfaces are pubescent. The upper margin of the rostrum is slightly declivous towards the tip, which is acute; it is armed above with six small acute teeth, which gradually decrease in size towards the tip. These six teeth are about equidistant; the anterior tooth is placed close to the tip, and the three posterior ones are situated on the dorsal surface of the carapace, the fourth being placed precisely above the frontal margin; the upper margins of these six teeth are microscopically crenulate and fringed with short hairs. They are preceded by a seventh small acute tooth found at the base of the rostrum, a little before the middle of the cephalothorax. The slightly ascending lower margin of the rostrum is entire and unarmed. The rostrum is continued backwards into a smooth, glabrous, blunt, scarcely elevated ridge, which divides immediately before the posterior margin of the carapace into two ridges, which proceed towards the posterior margin. In *P. Richtersii* the two posterior teeth of the rostrum are situated on the dorsal surface of the carapace.

The anterior margin of the cephalothorax is armed with an acute antennal spine and with a small supraocular tooth; there is also a small hepatic spine. The antennal and hepatic grooves are scarcely indicated; but the gastro-hepatic sulcus, which proceeds from the hepatic spine obliquely upwards and backwards towards the middle of the dorsal median ridge of the carapace, is distinctly marked. The antero-inferior angle of the cephalothorax is not toothed. The eye-peduncles are very short, and scarcely reach to the distal end of the antepenultimate joint of the antennular peduncles; the latter are a little shorter than the antennal scales. In nearly all these specimens the flagella of the internal antennæ are unfortunately broken off; in a single specimen only are they still partly preserved. These flagella are, as I suppose, about as long as their peduncles; the outer or upper one is much thicker than the other, but it soon tapers a little beyond the tips of the antennal scales. The peduncles of

the outer antennæ, concealed, in a dorsal view, by the much longer antennal scales, are a little shorter than the eyes; the naked flagella are nearly twice and a half as long as the cephalothorax, the rostrum included.

The strongly compressed postabdomen is nearly three times as long as the cephalothorax; the slightly impressed parts of its outer surface are pubescent, like those of the cephalothorax, whereas the slightly elevated parts are smooth and glabrous. The first three or anterior segments are smooth and glabrous on the dorsal median line; they are not at all carinate, though a longitudinal pubescent impression is observed on each side of the smooth and glabrous dorsal median line. The lateral surfaces of the postabdominal segments present other and similar impressions, some of which are longitudinal or oblique, whereas others are transverse. The fourth segment is slightly dorsally carinate, but its carina is rather obtuse; the fifth and sixth segments, however, are sharply keeled, and the carina of the sixth segment terminates posteriorly in a short acute angle or tooth, whereas the carinæ of the fourth and of the fifth segments are not at all toothed posteriorly. The posterior borders of the postabdominal segments are entire and smooth; those of the first and second segments present a small notch on each side, those of the fourth and of the fifth a similar somewhat deeper notch. The strongly compressed sixth segment is marked on each side with four longitudinal impressions. The terminal segment is scarcely longer than the sixth, narrow and acuminate; it is dorsally canaliculated along its whole length, and its lateral margins, which are fringed with some hairs, are quite unarmed and not spiniferous; in *P. Richtersii* the lateral margins are each armed with three mobile spines, and the telson is dorsally canaliculated only in its proximal half.

The outer maxillipeds have the same length in the male and female; they are rather short and are quite as long as the rostrum, and somewhat shorter than the peduncles of the external antennæ.

The anterior legs reach only to the distal end of the penultimate joint of the external maxillipeds and of the antennal peduncle; the second joint of these legs, the basipodite, is armed with a spine, but the third is unarmed. The hands are a little shorter than the carpopodites, and the fingers are a little longer than the palm. The legs of the second pair are a little longer than

the peduncle of the external antennæ; the basipodites are armed with an acute spine. The carpopodites of these legs are scarcely twice as long as the hands, the fingers of which are about as long as the palm. The third pair of legs, the last of the chelate, are still longer than the two anterior pairs, for they reach nearly to the distal ends of the penultimate joints of the peduncles of the internal antennæ, projecting with the whole hand beyond the peduncles of the outer antennæ. The basipodites of the third legs are also armed with a slender, acute spine, and their carpopodites are slightly longer than twice the length of the hands, the fingers of which are almost as long as the palm.

As in other species of this remarkable genus, the legs of the last two pairs present a different structure in the male and in the female. The legs of the fourth pair of the male are much shorter than those of the third pair, reaching only as far forwards as the anterior legs. The basipodites are unarmed, and the ischiopodites are as short as these joints; the meropodites have a characteristic form. These joints appear suddenly enlarged at their under margins near the proximal fourth of their length, and then again gradually taper towards their distal ends; the breadth of the enlarged part amounts to a fourth of the whole length of the joint. The carpopodites, which are a little shorter than the meropodites, present the usual slender form; the slender propodites are a little shorter than the carpopodites, being slightly longer than half the length of the meropodites. The straight, thin, and acute dactylopodites are only half as long as the carpopodites. The legs of the fifth pair are a little longer than the peduncles of the external antennæ; they are unarmed at their bases, like the legs of the fourth pair. The meropodites, which are slender and extend nearly as far forwards as the hepatic spine of the cephalothorax, present a peculiar notch or excavation near the proximal ends of their under margins; this notch is surmounted by a singular, subacute, slightly curved, lamelliform prominence or tooth. A similar structure has been described by Mr. Spence Bate as being proper to the male of *Penæus affinis*, M.-Edw. (Spence Bate, "On the Penæidæ," 'Annals and Magazine of Natural History,' 1881, vol. viii. p. 179), and, according to him, this peculiar notch is confined in that species to the ischium-joint of the fifth pair of legs, whereas in this species the meropodites are marked with

this singular tooth. The slender carpopodites reach to the anterior margin of the cephalothorax, and are a little shorter than the meropodites. The propodites are quite half as long as the meropodites, and the straight, acute dactylopodites are still a little shorter than the propodites.

As regards the female of this species, there is the strange fact that two of the eight female specimens differ slightly from the others by the structure of the last pair of legs and of the "ventral plate." These two specimens, however, completely agree in all other characters with the remaining six individuals.

The fourth pair of legs of the female are as long as in the male, reaching as far forwards as the anterior legs; these legs also fully resemble the corresponding legs of the male, but their meropodites are simple and not enlarged. The fifth pair of legs of both females are about as long as those of the male and are similar to them, but the meropodites are simple and do not present the peculiar notch and the characteristic surmounting tooth of the male. In six female specimens, which I shall speak of as A, the upper margin of the ischium-joint of the fifth pair of legs is dilated into a small, compressed, lamellate, triangular crest, broadest posteriorly and gradually tapering towards the distal end of the joint. In the two other female specimens (B) this crest is wanting, so that the ischiopodite presents the same form as in the male.

The singular organ called by Spence Bate the petasma presents a very characteristic form in *P. Lysianassa*, but so difficult to describe that I refer to the figure. The petasma, which reaches anteriorly to the bases of the second legs, consists of a longitudinal tube which presents a median longitudinal fissure on the posterior surface; the latter is convex anteriorly and slightly concave posteriorly. Each lateral margin of the petasma presents a small triangular prominence about its middle and directed forwards. At its distal end the petasma is armed on each side with two spines or teeth, the proximal of which is very acute, and the anterior surface bears two pairs of dentiform prominences, one pair near the base, the other near the distal extremity.

The rami of the uropoda are narrow, ovate, and much longer than the terminal postabdominal segment; they are slightly pubescent above, and fringed as usual with hairs along the lateral margins. In the male the outer surface of the basal joint of the uropoda

presents an oblique notch and another slight emargination is observed near the proximal end of the outer margin of the external urorami. A similar structure is proper to the male of *Penæus affinis*, M.-Edw., according to Spence Bate (*l. c.* p. 179, pl. xii. fig. 6 v). In the urorami of the female these notches are quite wanting.

The "ventral plate" of the female lying between the last two pairs of legs, strange to say, presents a different shape in the two forms of females; in the females A, in which the ischium-joint of the last pair of legs is triangularly dilated, the ventral plate is divided by three grooves, which meet one another in the centre, into three multangular smaller plates, a median anterior one and two lateral posterior ones. In the two other females, B, the ventral plate is not divided into secondary plates, the radiating grooves not being found in it.

This species is 60-70 millim. long from the tip of the rostrum to the end of the terminal postabdominal segment.

Penæus Lysianassa differs from *Penæus brevicornis*, M.-Edw., by its much shorter rostrum, by the longer flagella of the internal antennæ, and by many other characters, such as the form of the petasma, &c.

The Japanese *Penæus lamellatus*, de Haan, of which I have seen a type specimen from the Leyden Collection, is a quite different species, which may be recognized at first sight by its larger rostrum, armed with more numerous teeth, by its telson being spiniferous along its lateral margins, by the form of its petasma, &c.

Order STOMATOPODA.

Genus SQUILLA, Dana.

162. SQUILLA NEPA, Latr.

Squilla nepa, Latreille, *Encyclop. Méthodique*, x. p. 471; Milne-Edwards, *Hist. Nat. Crustacés*, t. ii. p. 522.

Squilla oratoria, de Haan, *Fauna Jap., Crustacea*, p. 223, pl. lx. fig. 2.

Squilla nepa, Miers, *On the Squillidæ*, *Ann. & Mag. Nat. Hist.* Jan. 1880, p. 25, pl. ii. fig. 13.

One specimen was collected in King Island Bay.

Some time ago, while in Leyden, I was able to compare a typical specimen of *Squilla lævis*, Hess, presented to the

Museum of Leyden by that of Göttingen, with specimens of the common *Squilla nepa*. As these two forms have been united by Mr. Miers, I may remark that in *Squilla lævis*, Hess, the rostral plate bears a median keel, that the lateral processes of the second and third thoracic segments are unilobate (and not bilobate as those of *Squilla nepa*), and that the postero-lateral angles of the carapace are not simply rounded, as in *Squilla nepa*, but project into a rather prominent lobe.

Squilla nepa, Latr., represents the European *Sq. mantis* in the seas of the Indo-Pacific region, having been recorded from the Indian Ocean (Zanzibar, Ceylon, Madras, Singapore), Java, the Philippines, Tahiti, and from the Chinese and Japanese seas. According to Milne-Edwards this species ranges as far as the coast of Chili. Miers mentions it as occurring on the eastern coast of Queensland, Australia, having been found at Port Curtis; but I suppose that it is represented on the south-eastern coast, namely, in the seas of Tasmania and New Zealand, by the closely allied *Squilla lævis*, Hess.

163. *SQUILLA RAPHIDEA*, *Fabr.*

Squilla raphidea, *Fabricius*, *Suppl. Entom.* p. 416; *Milne-Edwards*, *Hist. Nat. Crustacés*, t. ii. p. 524.

Squilla harpax, *de Haan*, *Fauna Japonica*, *Crustacea*, p. 222, pl. li. fig. 1.

Squilla raphidea, *Miers*, *l. c.* p. 27.

Five specimens were collected in the Mergui Archipelago.

Squilla raphidea has been recorded from Zanzibar, Borneo, and the Philippine Islands, and is distributed throughout the whole Indian Ocean, the Malayan Archipelago, and the Japanese seas.

Genus *PSEUDOSQUILLA*, *Guérin*.

164. *PSEUDOSQUILLA PILAENSIS*, n. sp.

This interesting species was collected at Elphinstone Island. It appears to be nearly allied to *Pseudosquilla Cerisii*, Roux, a form occurring in the Mediterranean, which constitutes, with the American *Pseudosquilla Lessonii*, M.-Edw., the second section of the genus *Pseudosquilla* in the 'Monograph of the Squillidæ,' published by Miers. This new form, which evidently represents that section in the Indian seas, may be distinguished, however, at first sight, from the two latter species by the dactyli of its

raptorial limbs being armed with three spines besides the elongated curved terminal spine, and by the armature of the distal prolongation of the base of the uropoda. But *Pseudosquilla pilaensis* is so much the more interesting, because it forms a transition from the genus *Pseudosquilla* to the genus *Lysiosquilla*, (1) by the eye-peduncles being dilated at the distal end, having the cornea bilobate, (2) by the terminal segment of the postabdomen being transverse, much broader than long.

In its outer appearance this species agrees more or less with the Japanese *Lysiosquilla latifrons* (Fauna Japonica, pl. li. fig. 3). The carapace is but little longer than broad, is little narrowed anteriorly, its antero-lateral angles are rather obtuse, and its postero-lateral ones are broadly rounded. The upper surface is smooth, even when seen under a magnifying-glass, and presents the two ordinary, longitudinal, submedian sutures, which are straight and continuous, from the anterior to the posterior margin, but no transverse cervical suture. As in *Pseudosquilla Cerisii*, the rostral plate terminates in a prominent, acute spine, which projects a little beyond the eyes, though not reaching the distal end of the antepenultimate joint of the internal antennæ; the basal portion of the plate is more than twice as broad as long, and its antero-lateral angles are rather obtuse. The upper surface of the rostral plate is perfectly smooth. The eye-peduncles are short, reaching only to the middle of the antepenultimate joint of the internal antennæ; they are dilated at their distal ends, and the cornea is bilobate, presenting a larger internal and a somewhat smaller external lobe. The internal antennæ have the ordinary length, their peduncles being as long as the carapace; the last joint of the peduncle is a little shorter than the penultimate, whereas in most species of the genus *Pseudosquilla* it is longer. The flagella of the internal antennæ are a little shorter than their peduncles, and the latter does not extend as far forward as the external antennæ, which are a little longer.

The upper surfaces of the four exposed thoracic segments and of the segments of the postabdomen are rounded and smooth; the first exposed thoracic segment is laterally prolonged into a very short acute lobe, constituting the lateral angles of the posterior margin. The two following are laterally rounded, with entire margins, whereas the last presents a very small subacute prominence. The fifth or antepenultimate segment of the post-

abdomen presents on each side two linear impressions close and parallel to the lateral margins, which are confluent posteriorly. A trace of such an impressed line is found on the fourth segment, but the five anterior postabdominal segments have their upper surfaces perfectly smooth. The postero-lateral angles of the three anterior postabdominal segments are rounded and obtuse, but those of the fourth and fifth segments terminate in an acute spinule. The sixth segment is armed, as usual, with six, longitudinal, very acute spines; those which constitute the postero-lateral angles are the longest, extending most backwards. The distance between the two submedian spines is less than that of the next spine from each of them, and even a little less than the distance between the two lateral spines. The terminal segment is transverse, being much broader than long and about as long as the preceding segment. In its armature this segment much resembles that of the other species of the genus *Pseudosquilla* and appears even to be similar to *Pseudosquilla Lessonii*. The posterior margin is armed with six acute spines, of which the two submedian are mobile and well developed; they are placed close to one another, and no teeth are observed between them. Between the submedian spines and the first lateral ones I observe two small truncate teeth, and a similar small truncate tooth occurs between the first and the second lateral spines.

The upper surface of the segment presents a compressed, elevated, longitudinal, median keel, terminating posteriorly in an acute spine; on each side of the median keel five longitudinal carinæ are observed (the keeled lateral margin being included), of which the first and the third, however, are interrupted, the others being continuous. The first, situated next to the median keel, consists, more properly, of a longitudinal row of three acute spines (that of the left side presenting only two spines); the second lateral carina is continuous, but terminates posteriorly in two small acute spinules, placed one behind the other. The third lateral keel is again interrupted in the middle, the posterior portion terminating in an acute spinule; the fourth lateral keel is continuous, and proceeds upon the external lateral spine of the posterior margin even to its point. The under surface of the terminal segment is armed with four acute spines, two on each side, corresponding with the interstices between the spines of the posterior margin.

The dactyli of the raptorial limbs are armed with three spines besides the elongated, curved, terminal spine. The appendages of the three posterior thoracic limbs are slender and styliiform. The distal prolongation of the base of the uropoda is also distinctive of this species. It terminates in a strong spine armed along the proximal half of its inner margin with five acute spines, and having a spine also on its outer margin inserted about on the middle of its distal half. The distal prolongation of the base of the uropoda may therefore also be described as terminating near its extremity in two spines, of which the inner one is twice as long as the outer. In *Pseudosquilla Lessonii* and *P. Cerisii* the inner margin presents only two teeth or spines.

Dimensions :—

	millim.
Length of the whole animal, from the tip of the rostral plate to the posterior margin of the last postabdominal segment	50
Length of the carapace (without the rostrum)	9½
Length of the rostral plate	3½

Genus GONODACTYLUS, Latr.

165. GONODACTYLUS CHIRAGRA, Fabr.

Squilla chiragra, Fabricius, *Suppl. Entom.* p. 417; Desmarest, *Considérations*, &c. pl. xliii.

Gonodactylus chiragra, Latreille, *Encyclop. Méthodique*, x. p. 473, Atlas, pl. cxxv. fig. 2; Milne-Edwards, *Hist. Nat. Crust.* ii. p. 528; Miers, *Ann. & Mag. Nat. Hist.* Jan. 1880, p. 40.

Twelve, mostly small and young, specimens of this common species were collected, eight at Elphinstone Island, one at Owen Island, one in King Island Bay, and two very young individuals at Sullivan Island.

In one of the specimens from Elphinstone Island the lateral lobes of the rostrum are a little more prominent and somewhat more acute than usual; and in another specimen from the same locality the two submedian longitudinal prominences of the sixth segment of the postabdomen are grown together, being not spiniferous.

Gonodactylus chiragra has been recorded from the Mediterranean (*Milne-Edwards*), the whole Indo-Pacific region (Red Sea, Zanzibar, Natal, Rodriguez, Australia, Philippine and Fiji Islands, Tongatabu), and from the coast of America (Panama).

Order PÆCILPODA.

Genus LIMULUS, Müll.

166. LIMULUS MOLUCCANUS, Latr.

Limulus moluccanus, Latreille, Milne-Edwards, *Hist. Nat. Crust.* ii. p. 547.

One specimen was obtained at Mergui in the mud at low water.

167. LIMULUS ROTUNDICAUDA, Latr.

Limulus rotundicauda, Latreille, Milne-Edwards, *Hist. Nat. des Crust.* ii. p. 550.

An immature female specimen was collected at Mergui and another at King Island Bay.

This species, like the preceding, inhabits the Malayan Archipelago and the neighbouring seas.

EXPLANATION OF THE PLATES.

PLATE I.

- Fig. 1. *Doclea Andersoni*, nat. size. Fig. 2. Lateral view of the hand, $\times 2$.
 Fig. 3. *Hyastenus Hilgendorfi*, adult male, $\times 1\frac{1}{2}$. Fig 4. Lateral view of the body, $\times 1\frac{1}{2}$, showing the obtuse angle made by the rostral spines with the anterior declivity of the gastric region.
 Fig. 5. *Harrovia elegans*, $\times 3$. Fig. 6. Lateral view of the hand, $\times 3$.

PLATE II.

- Fig. 1. *Myomenippe granulosa*, adult male, nat. size.
 Fig. 2. *Actumnus nudus*, adult female, $\times 3$. Fig. 3. Smaller chela, $\times 3$.
 Fig. 4. *Eurycarcinus maculatus*, adult male, $\times 3$. Fig. 5. Lateral view of the larger hand, $\times 3$.

PLATE III.

- Fig. 1. *Heteropanope indica*, adult male, $\times 3$. Fig. 2. Lateral view of larger hand, $\times 3$.
 Fig. 3. *Heteropanope eucratoides*, adult male, $\times 3$. Fig. 4. Lateral view of chela, $\times 3$.
 Fig. 5. *Pilumnus Andersoni*, adult female, $\times 3$. Fig. 6. Lateral view of larger hand, $\times 3$.

PLATE IV.

- Fig. 1. *Pilumnus laevis*, $\times 8$. Fig. 2. Lateral view of larger chela, $\times 7$.

- Fig. 3. *Neptunus Andersoni*, adult female, $\times 2$. Fig. 4. Natatory leg, $\times 4$.
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 Fig. 7. *Thalamita spinimana*, adult female, dorsal view of the frontal and orbital region, nat. size.
 Fig. 8. *Thalamita Danæ*, adult male, dorsal view of the frontal and orbital region, nat. size. Fig. 9. Abdomen, nat. size.

PLATE V.

- Fig. 1. *Goniosoma cruciferum*, dorsal view of the anterior half of the upper surface of the cephalothorax of a male specimen, nat. size.
 Fig. 2. *Goniosoma affine*, dorsal view of the cephalothorax of an adult female, $\times 1\frac{1}{2}$.
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- Fig. 1. *Telphusa Callianira*, adult male, $\times 2$. Fig. 2. Anterior view of the frontal and antennal region, of the orbits and of the epistome, $\times 3$.
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 Fig. 8. *Gelasimus acutus*, adult male, $\times 1\frac{1}{2}$. Fig. 9. View of the frontal and antennal region of the orbits and of a part of the external maxillipeds of the same, $\times 1\frac{1}{2}$.

PLATE VIII.

- Fig. 1. *Gelasimus acutus*, outer view of the larger hand, $\times 1\frac{1}{2}$. Fig. 2. Inner view of the same hand, $\times 1\frac{1}{2}$. Fig. 3. A variety of the larger

- hand, $\times 1\frac{1}{2}$. Fig. 4. Larger hand of a young male, whose cephalothorax is only 18 millim. broad, $\times 2$.
- Fig. 5. *Gelasimus annulipes*, outer view of the larger hand of the adult male, $\times 2$. Fig. 6. Inner view of the same hand, $\times 2$. Fig. 7. A variety of the larger hand of the male, $\times 2$.
- Fig. 8. *Gelasimus triangularis*, adult male, $\times 2$. Fig. 9. Outer view of the larger hand of the male, $\times 2$. Fig. 10. Inner view of the same hand, $\times 2$. Fig. 11. Abdomen of the male, $\times 2$.
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PLATE IX.

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PLATE X.

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- Fig. 4. *Pyridognathus Deianira*, adult female, $\times 2$. Fig. 5. Inferior view of the cephalothorax, $\times 3$. Fig. 6. Outer view of the larger (left) hand, $\times 2$.
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- Fig. 1. *Metaplex dentipes*, adult male, nat. size. Fig. 2. Inferior view of the cephalothorax, $\times 2$, showing the infraorbital ridge, the orbits, and the outer foot-jaws. Fig. 3. Outer view of the larger hand, $\times 2$.
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- Fig. 7. *Metaplex intermedius*, $\times 2$. Fig. 8. Inferior view of the anterior half of the cephalothorax, $\times 3$, showing the infraorbital ridge, the orbits, the outer foot-jaws, &c. Fig. 9. Outer view of the larger hand, $\times 3$.

PLATE XII.

- Fig. 1. *Sesarma Andersoni*, adult male, $\times 1\frac{1}{2}$. Fig. 2. Outer view of the larger hand of the male, $\times 3$. Fig. 3. Larger hand of the male, viewed from above, $\times 3$. Fig. 4. Outer view of the meropodite of a leg of the last pair, $\times 4$.
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PLATE XIII.

- Fig. 1. *Sesarma Edwardsi*, male, nat. size. Fig. 2. Abdomen of the male. Fig. 3. Outer view of the hand of the male. Fig. 4. Inner view of the same chela.
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- Fig. 1. *Porcellana Euphrosyne*, adult female, $\times 2$. Fig. 2. Chelipede, viewed from its internal side, $\times 2$. Fig. 3. Outer view of the hand, $\times 2$.

- Fig. 4. *Diogenes merguiensis*, dorsal view of the anterior part of the cephalothorax, $\times 4$, showing the antennæ, the eye-peduncles, the rostrum, &c. Fig. 5. Outer view of the larger hand, $\times 3$. Fig. 6. Left leg of the third pair, $\times 3$.
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PLATE XVII.

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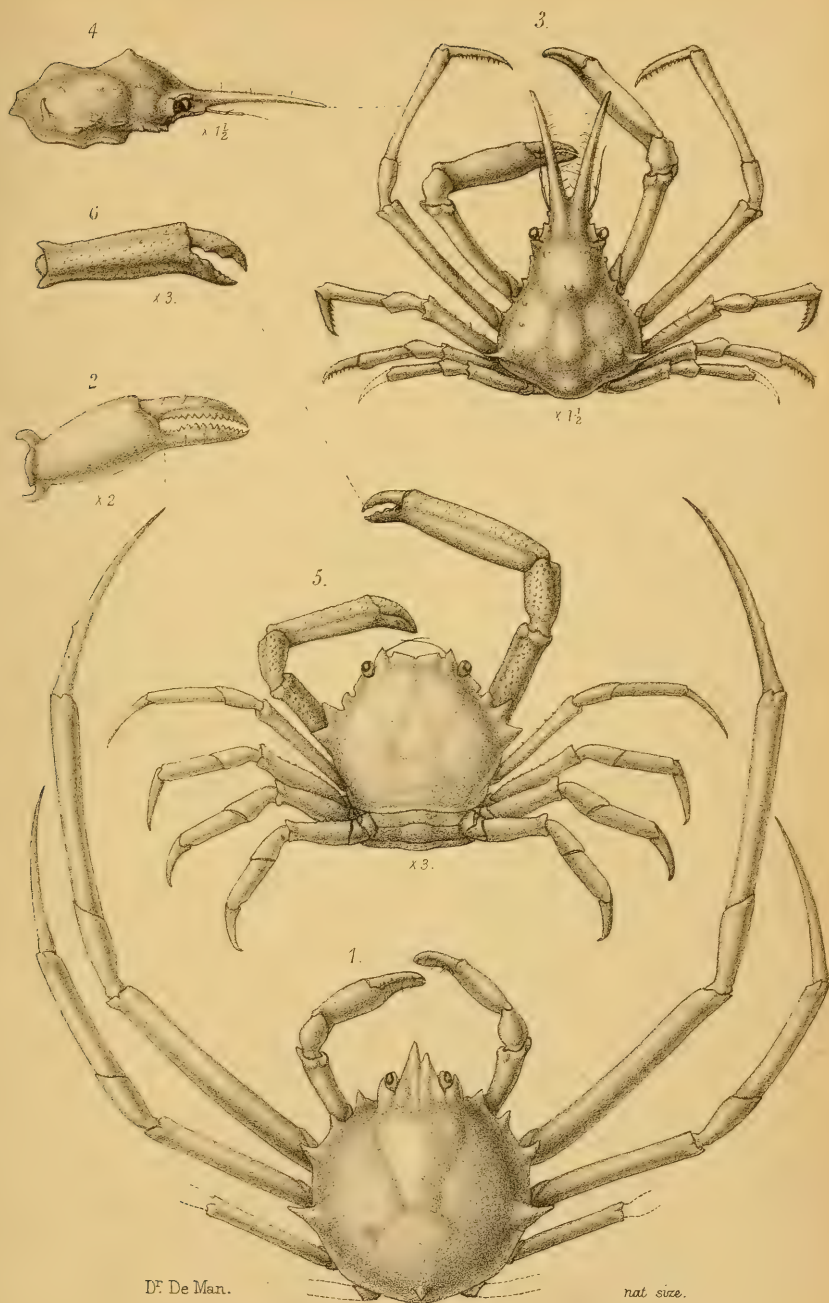
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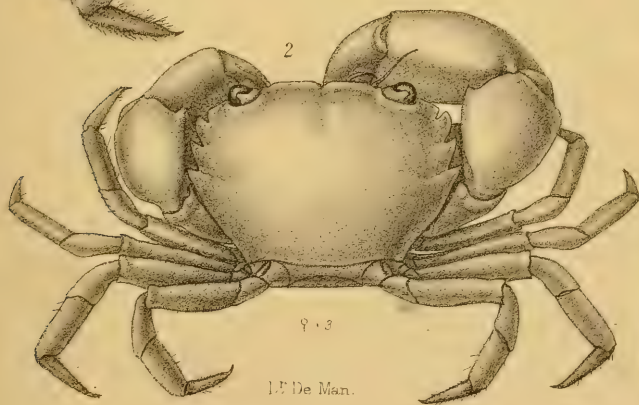
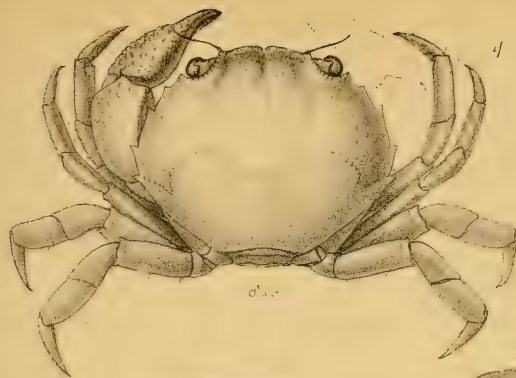
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nat size.

1, 2. *DOCLEA ANDERSONI*.
Berjeau & Highley lith.

3, 4. *HYASTENUS HILGENDORFI*.
5, 6. *HARROVIA ELEGANS*.

Mintern imp.

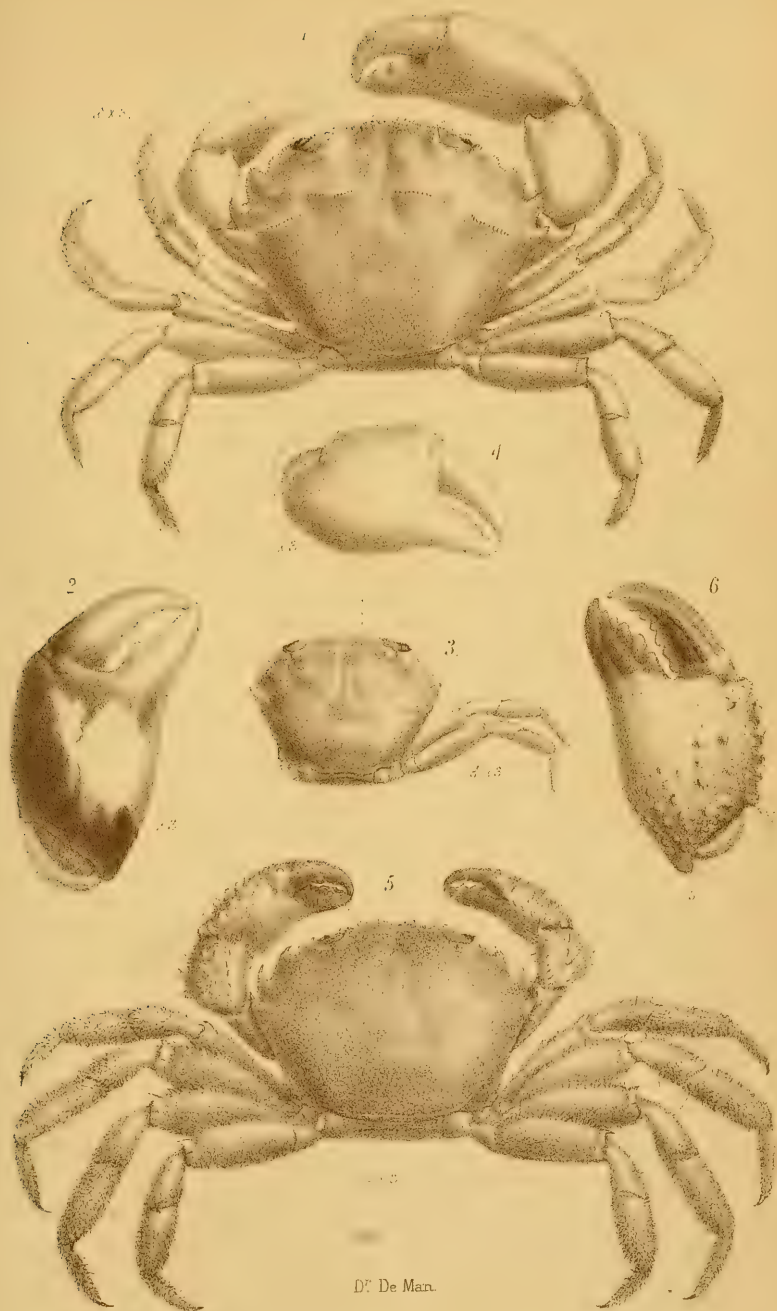


1. MYOMENIPPE GRANULOSA. 2, 3. ACTUMNUS NUDUS.

Berjeau & Highley lith.

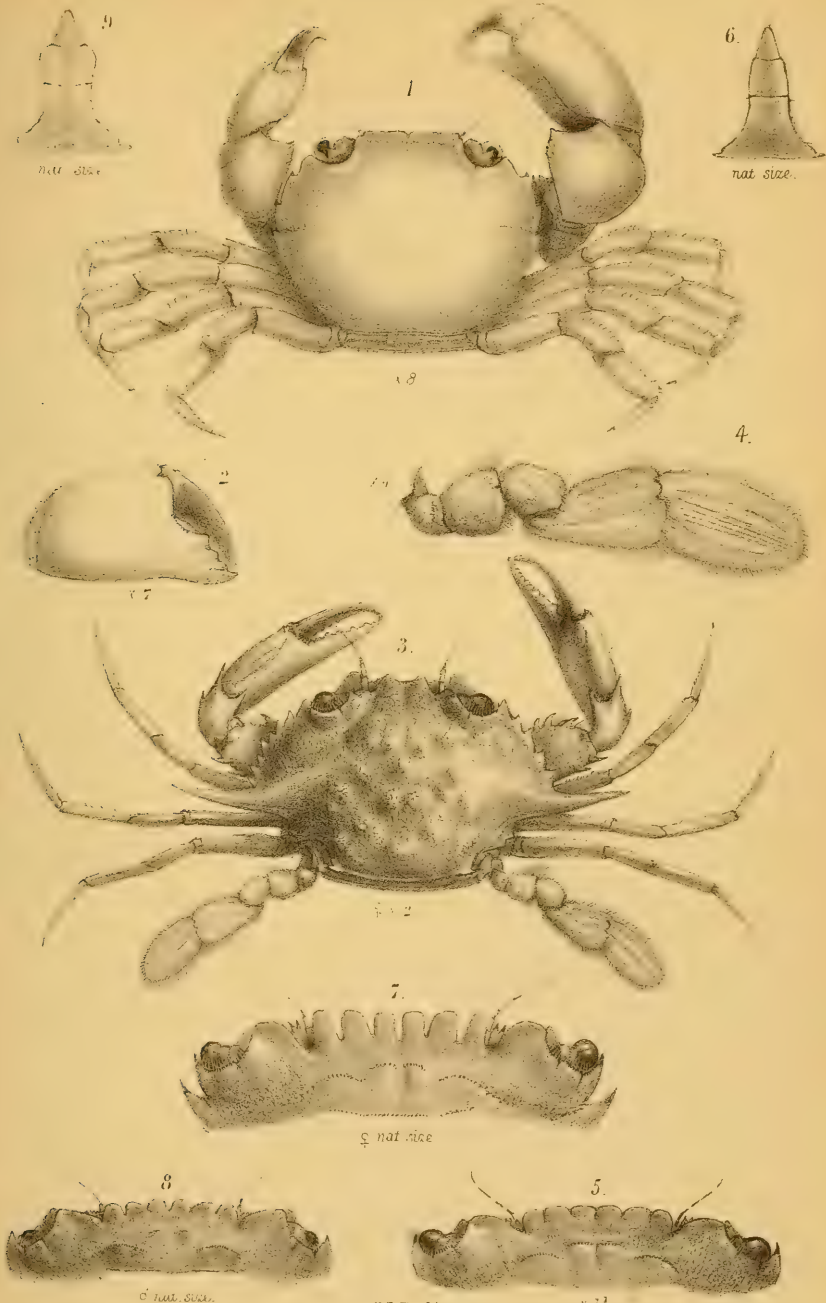
(4, 5) EURYCARCINUS MACULATUS.

Mintern. imp.



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1, 2. HETEROPANOPE INDICA. 3, 4. H. EUCRATOIDES.
Crowther lith. 5, 6. PILUMNUS ANDERSONI. McIntern imp.



Michael lith.

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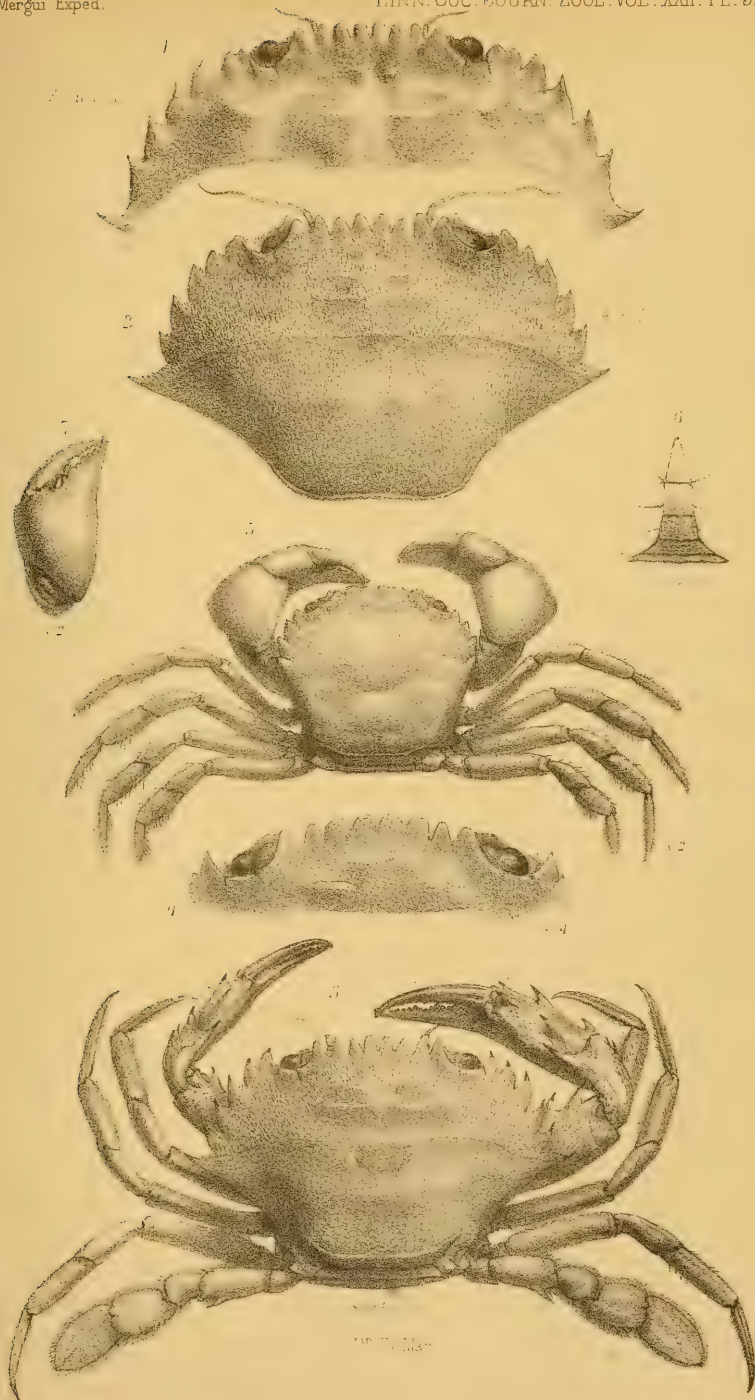
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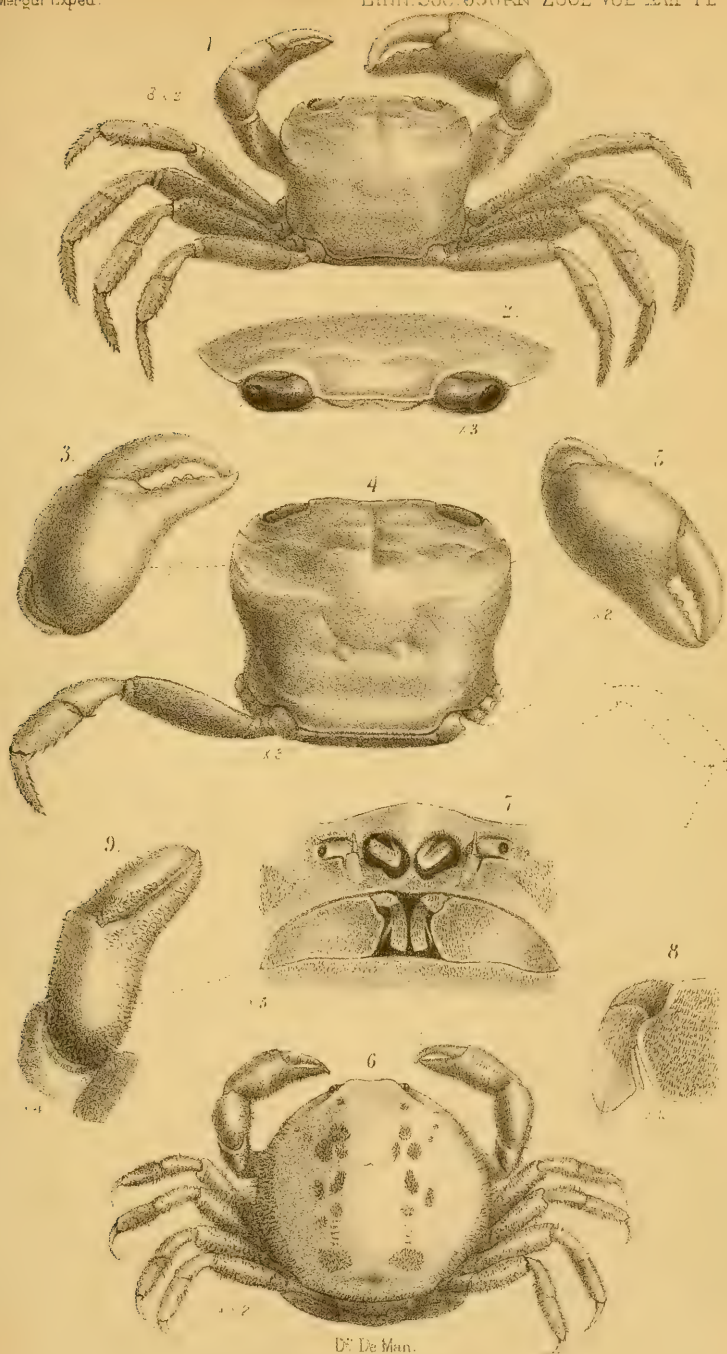
1, 2. PILUMNUS LÆVIS.

3, 4. NEPTUNUS ANDERSONI.

5, 6. THALAMITA PRYMNA. 7, 8, 9. T. DANÆ.

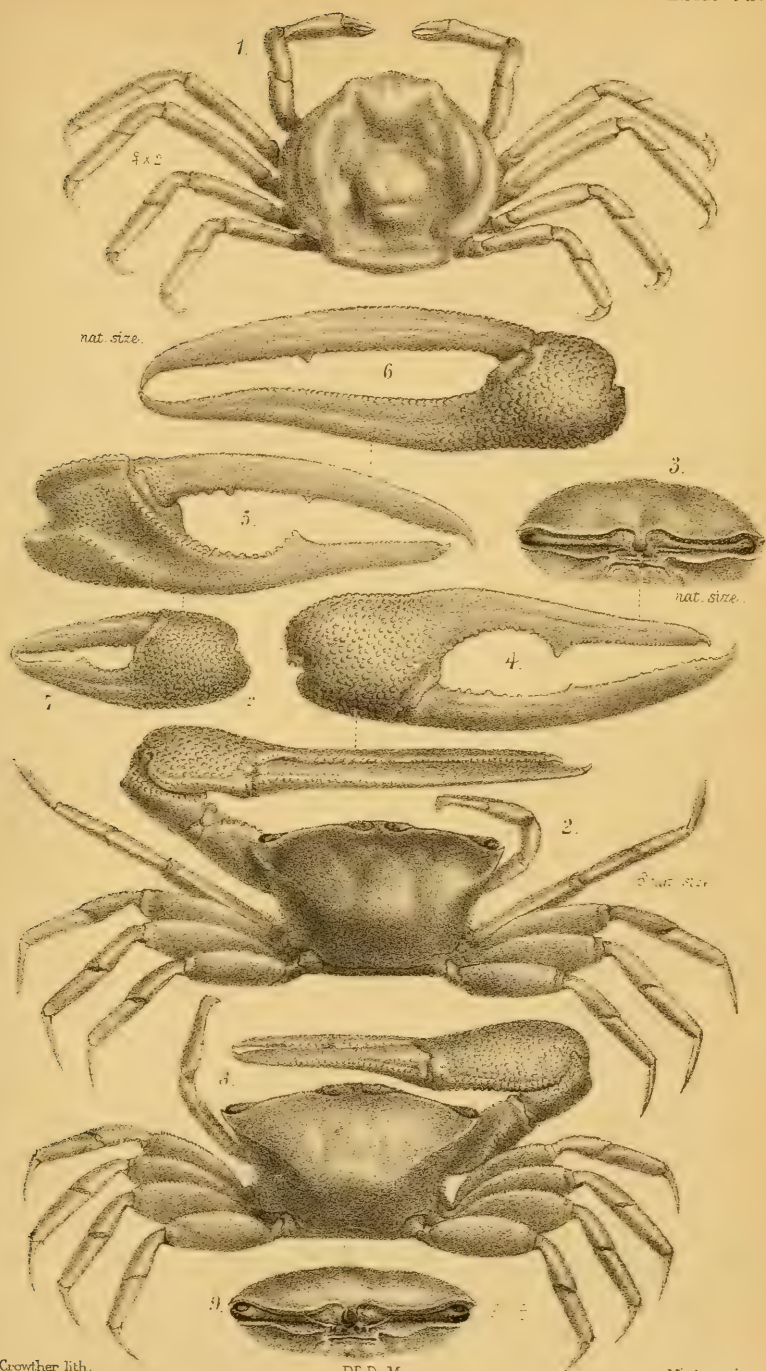


1. GONIOSOMA CRUCIFERUM. 2. G. AFFINE. 3, 4. G. MERGUIENSE.



1-3. TELPHUSIA CALLIANIRA. 4-5. T. CARINIFERA.

6-9. PINNOTHERES EDWARDSI.

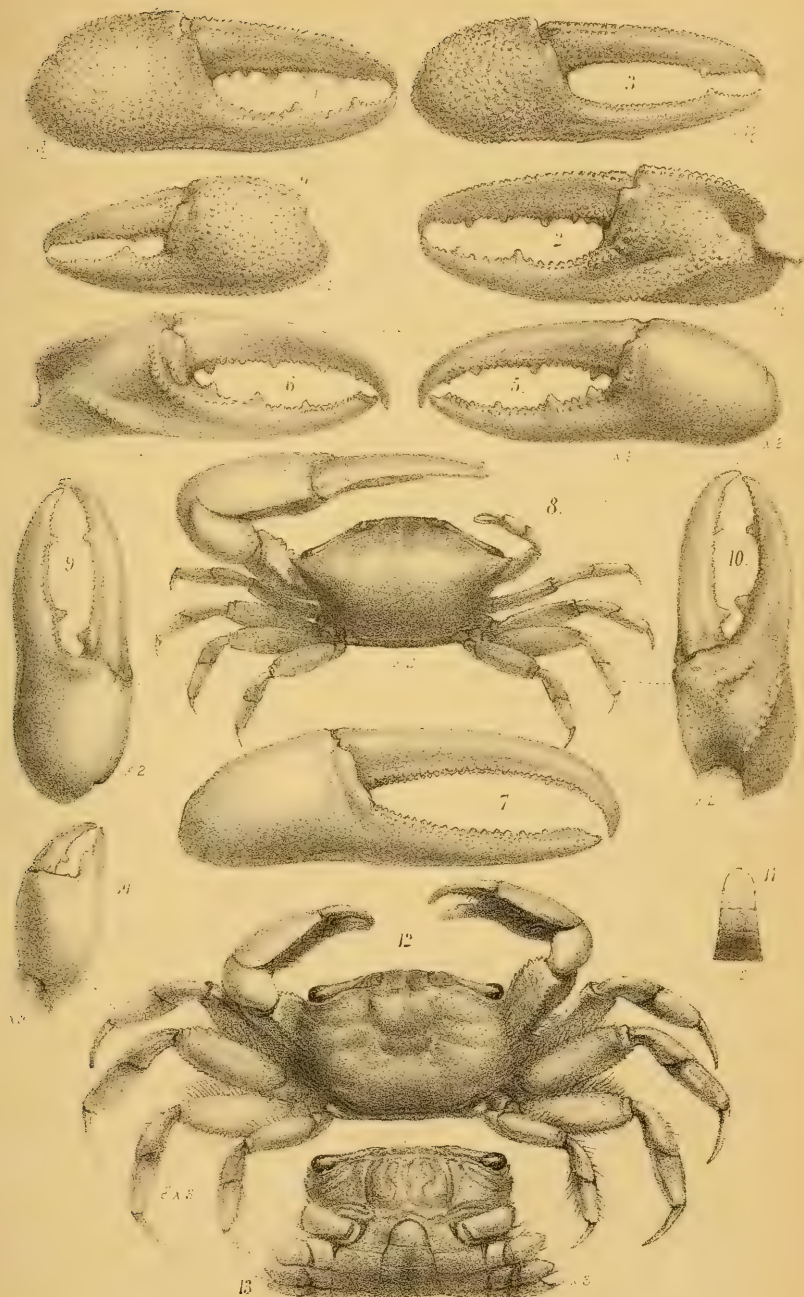


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1 XANTHASIA Sp? 2-7. GELASIMUS DUSSUMIERI. 8-9. D. ACUTUS.



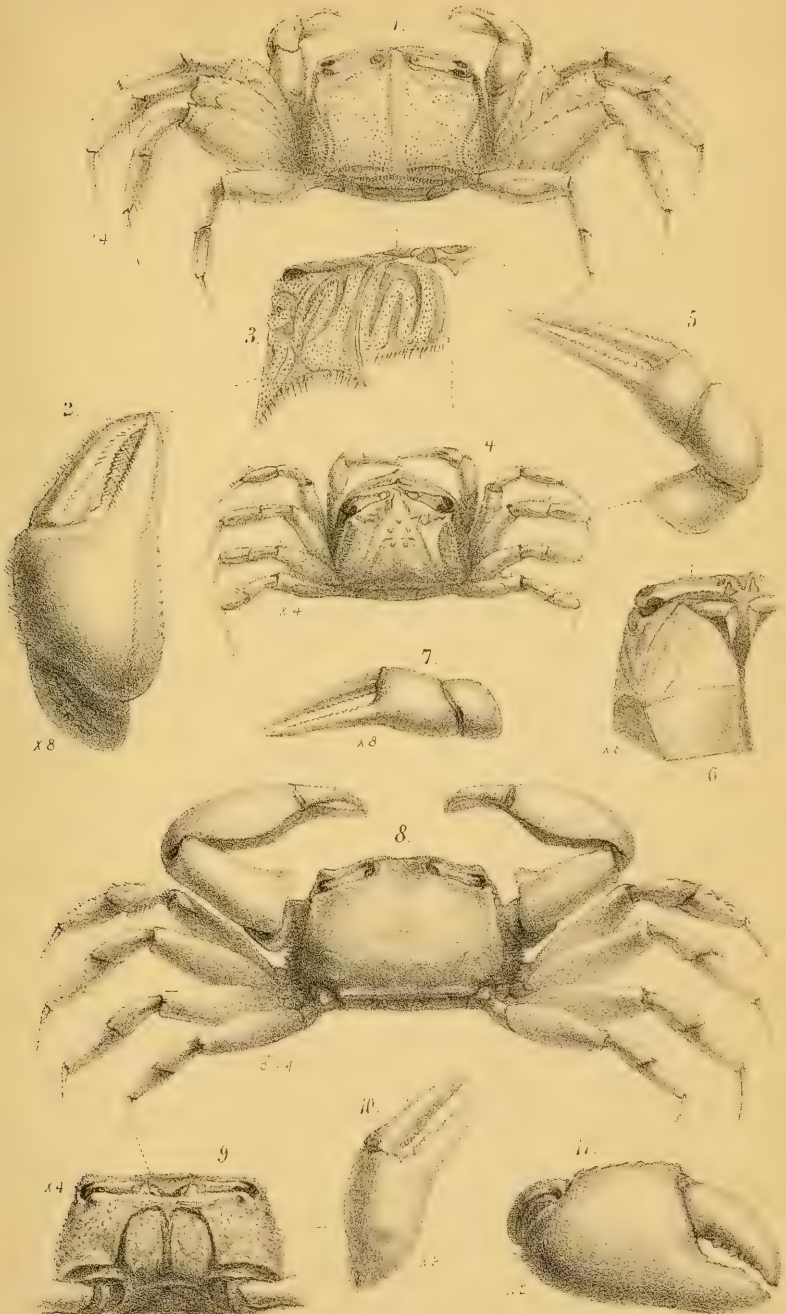
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1-4. *GELASIMUS ACUTUS*. 5-7. *G. ANNULIPES*. 8-11. *G. TRIANGULARIS*.

Michael del.

12-14. *MACROPHTHALMUS ERATO*.

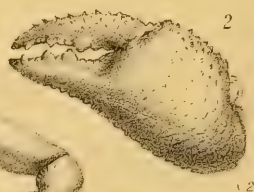
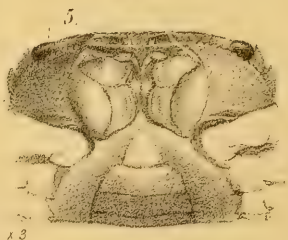
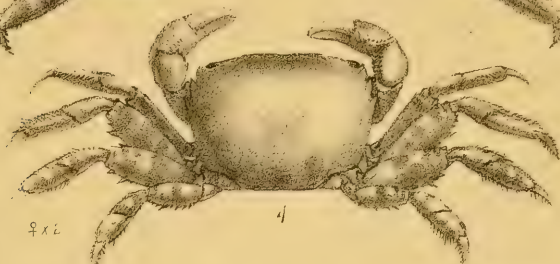
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1-3. DOTILLA BREVITARSIS 4-6. D. INTERMEDIA. 7. D. SULCATA.

Michael lith. 8-10. DIOXIPPE ORIENTALIS. 11. METOPOGRAPSUS MESSOR. Mintern imp.



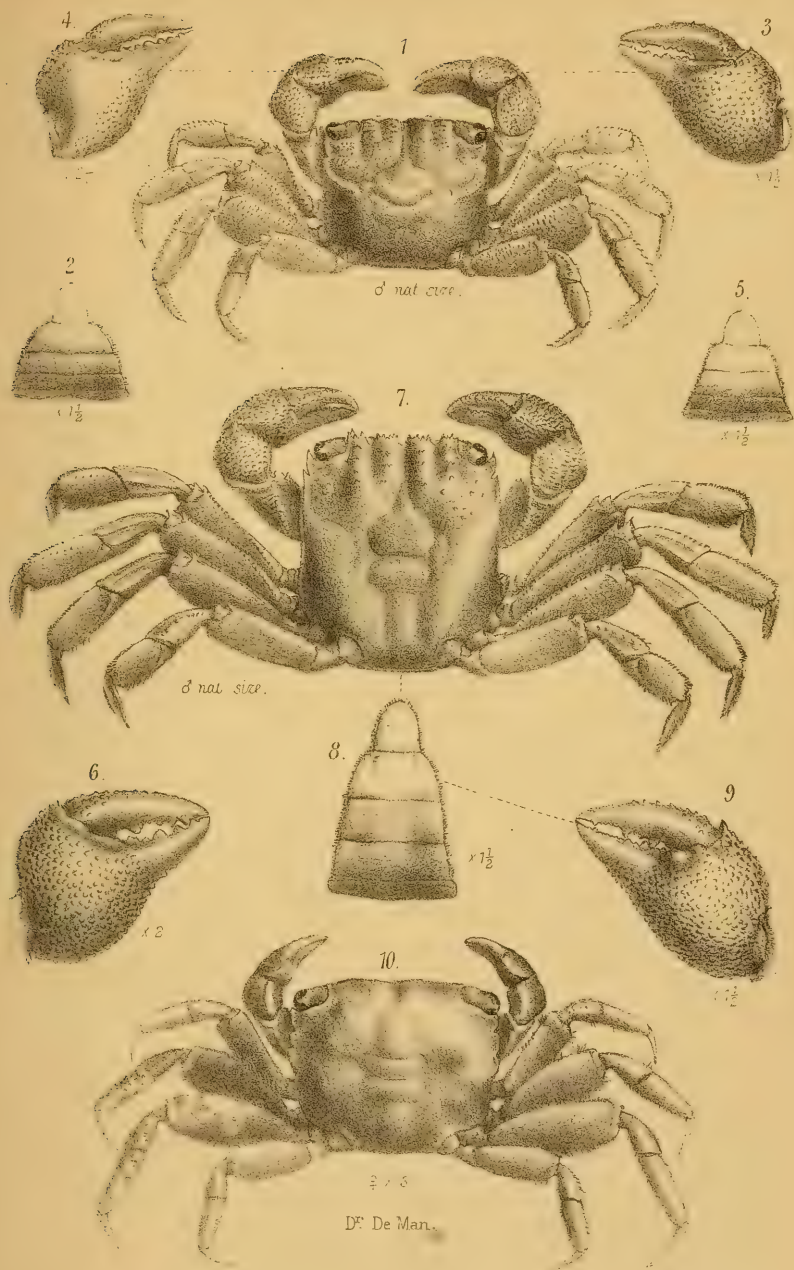
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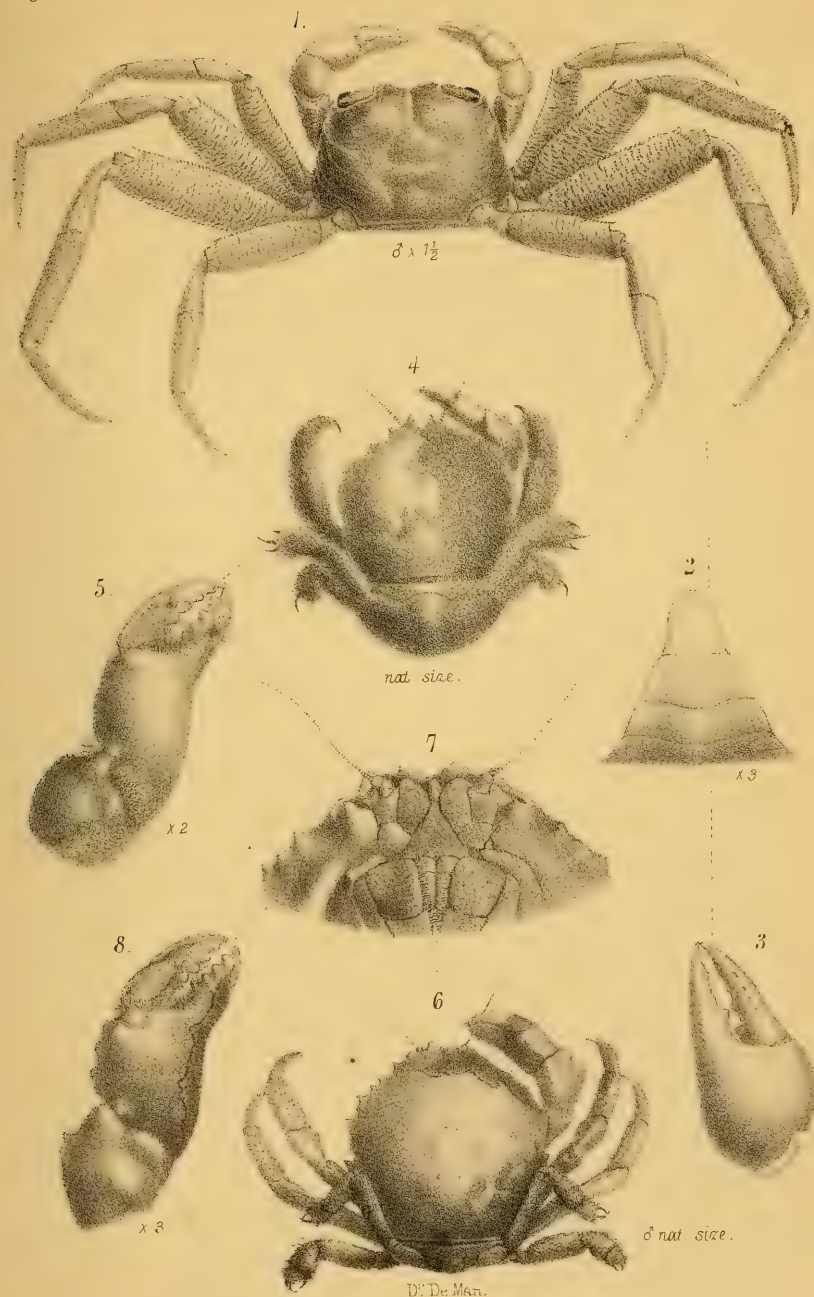
1-3. METOPOGRAPSUS MACULATUS.

Mintern imp.

4-6. PYXIDOGNATHUS DEIANIRA. 7-9. METAPLAX DISTINCTUS.

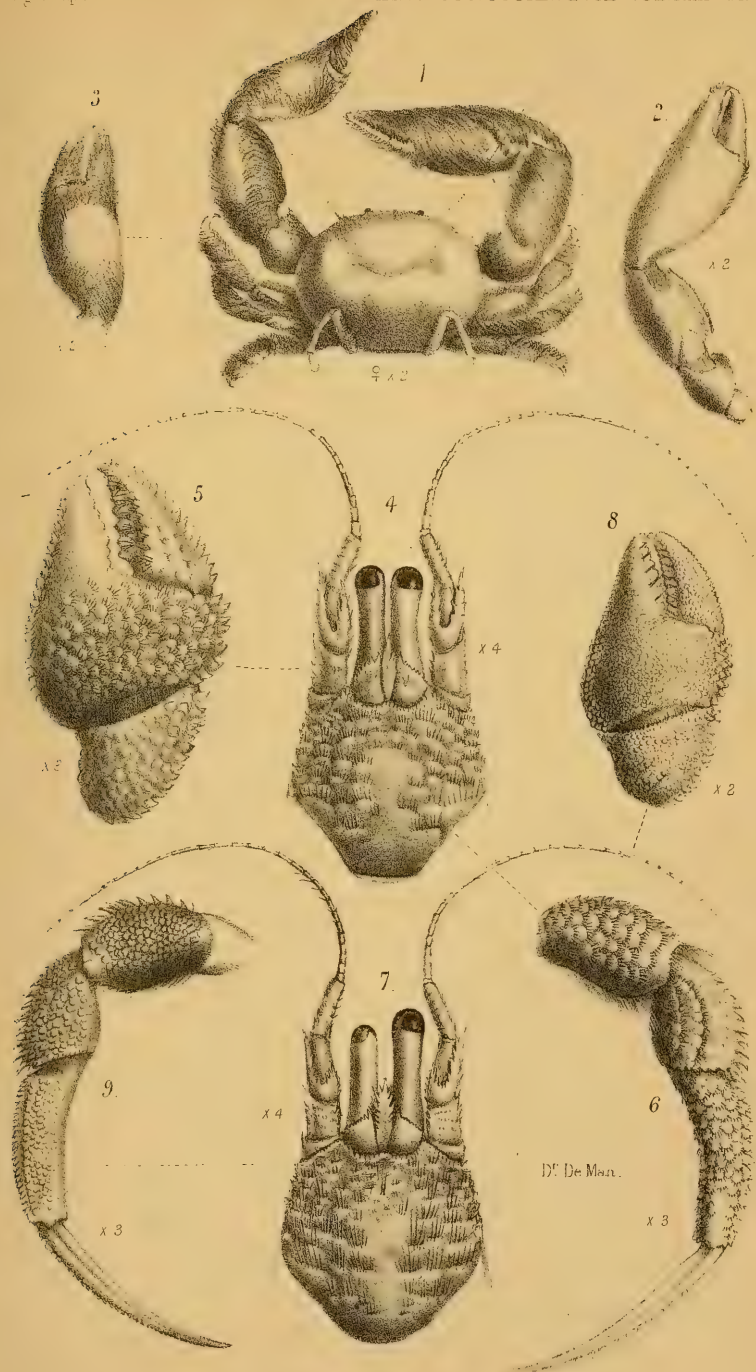


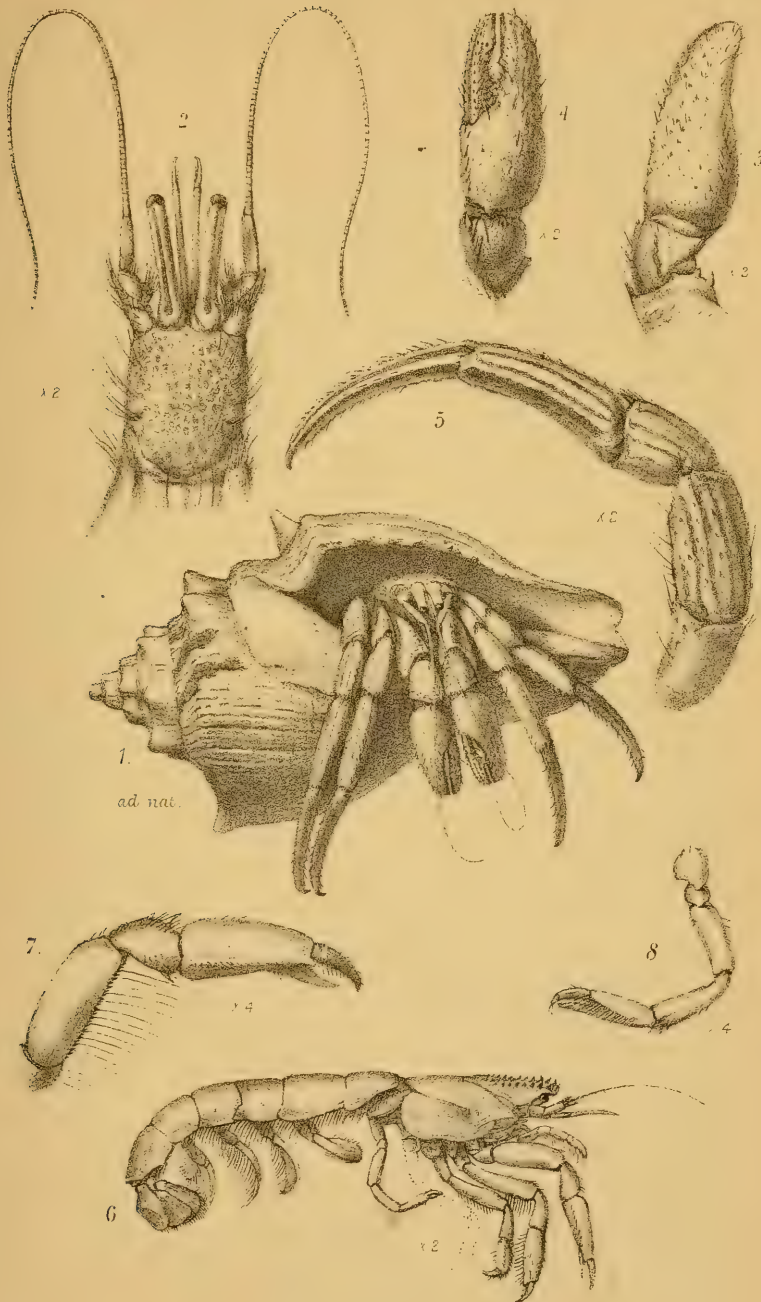
1-4. *SESARMA EDWARDSI*. 5, 6. *S. EDWARDSI* VAR. *CRASSIMANA*.
 Crowther lith. 7-9. *S. POLITA*. 10. *CLISTOCOELOMA MERGUIENSE*. Mintern imp.



1-3. SESARMA KRAUSSI 4 5. DROMIDIA UNIDENTATA.

6-8. D. CRANIOIDES.

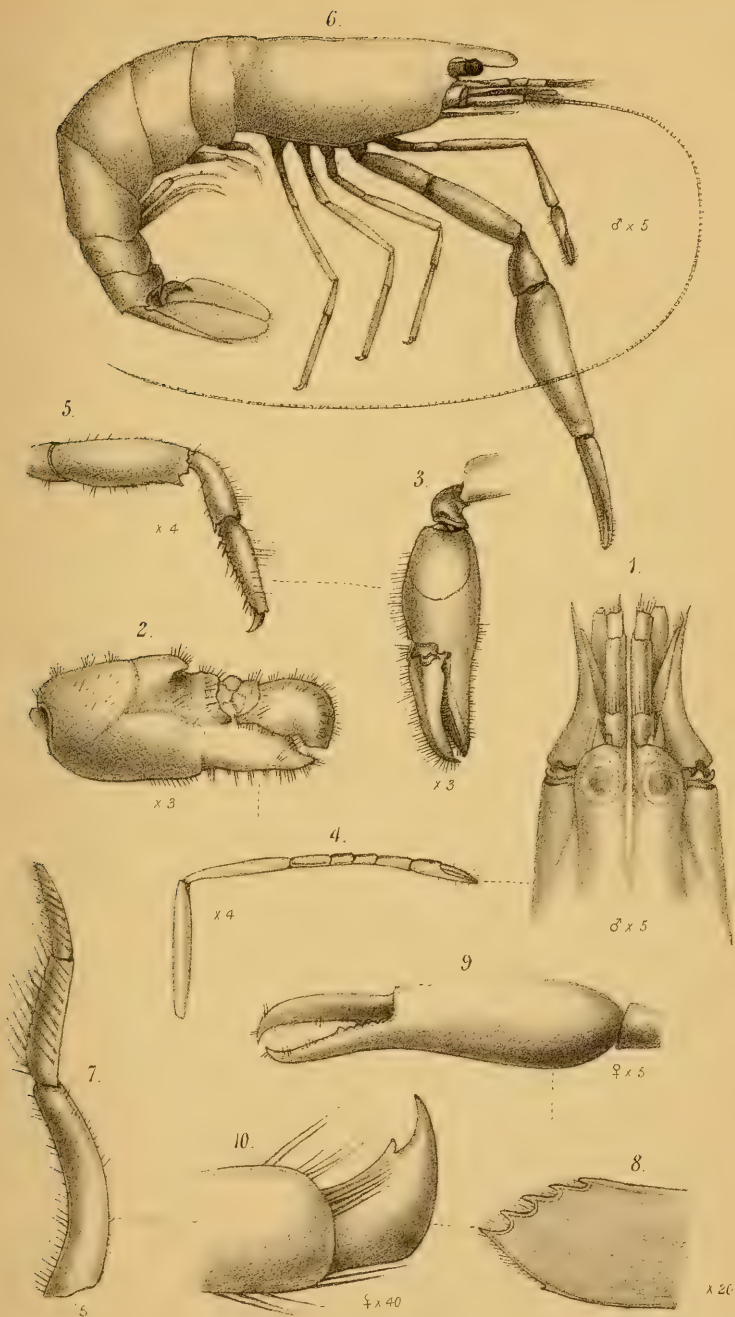


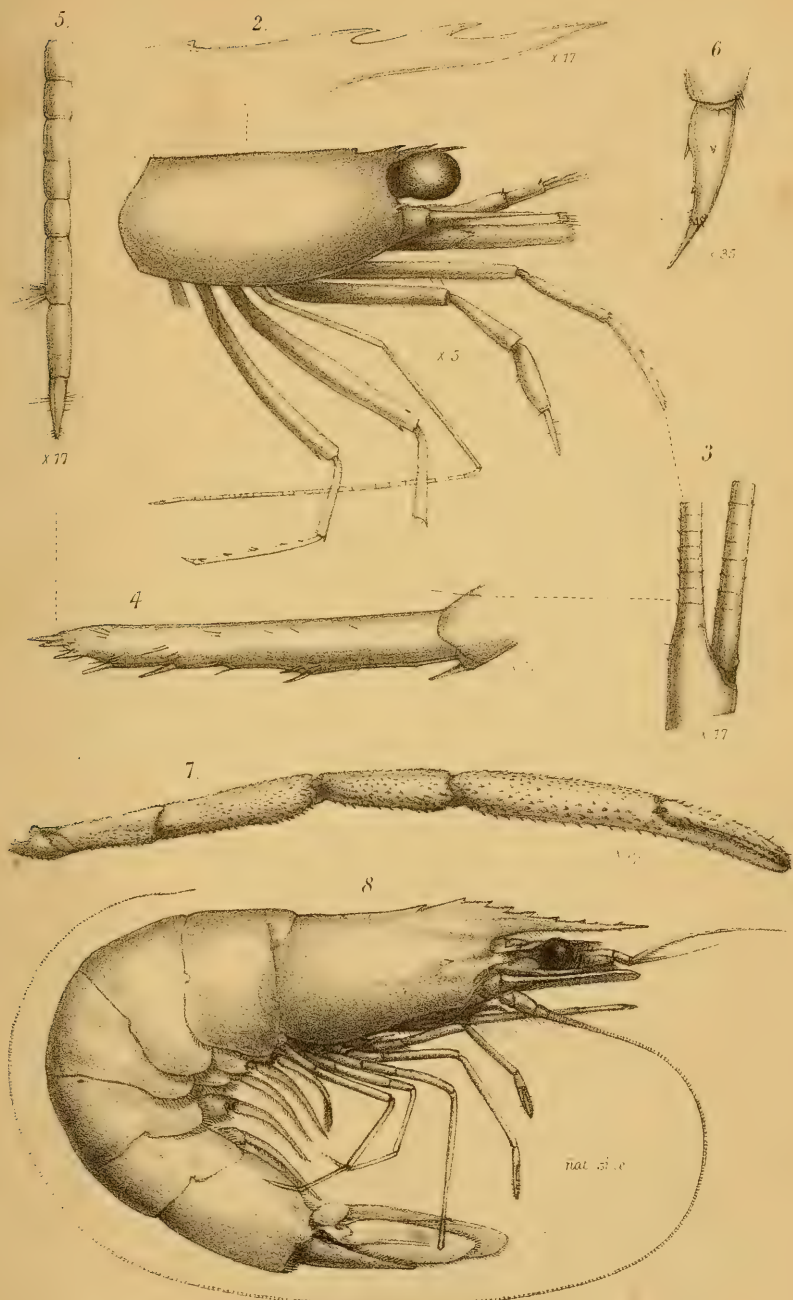


Michael del.

Mintern imp.

1-5. CLIBANARIUS PADAVENSIS. 6-8. GEBIOPSIS INTERMEDIA.





D. De Man del.

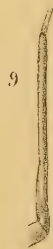
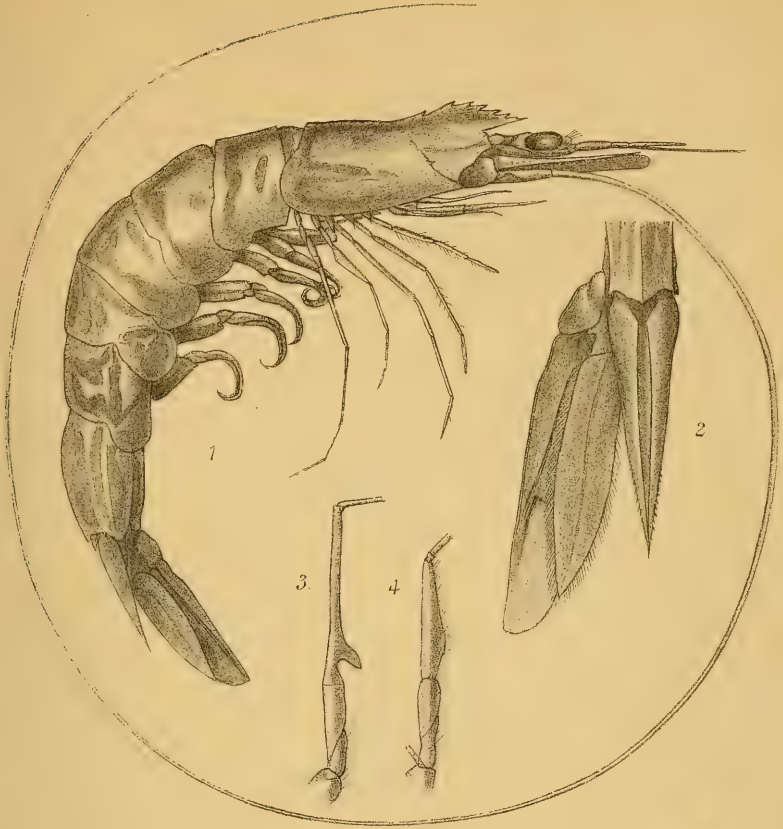
1-6. HIPPOLYTE OLIGODON.

7. PALAEMON ACUTIROSTRIS.

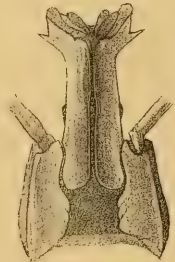
8. PENAEUS MERGUIENSIS.

Michael lith.

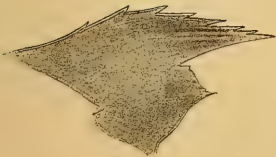
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8



7



De Man del.

Mintern, imp.

Michael lith.

PENÆUS LYSIANASSA.